



University of Bradford eThesis

This thesis is hosted in [Bradford Scholars](#) – The University of Bradford Open Access repository. Visit the repository for full metadata or to contact the repository team



© University of Bradford. This work is licenced for reuse under a [Creative Commons Licence](#).

THE INTERNATIONALISATION OF SOFTWARE FIRMS: EVIDENCE FROM BRAZIL

An integrative framework for the study of the impact of
business network collaboration on international
engagement through exports and imports

RAISSA A. ROSSITER

PhD

UNIVERSITY OF BRADFORD

2011

The Internationalisation of Software Firms: evidence from Brazil

Raissa A. Rossiter

Many studies have recognised the importance of a variety of factors in the internationalisation of firms. Only a few, however, have attempted to integrate these factors into a comprehensive framework. In this study, taking the network approach as its main analytical foundation, an integrative theoretical framework is developed and tested empirically to assess the impact of a wide range of factors on the internationalisation of firms. The internationalisation phenomenon is examined in a more comprehensive manner than in many previous studies, as a two-sided process of both inward and outward international operations.

Using logistic regressions in the analysis of empirical evidence gathered through a national survey sample of 148 Brazilian software firms, the theoretical framework proposed in this study obtained substantial support. The findings expand previous knowledge through a comprehensive explanation that incorporates determinant factors from four distinct dimensions – contextual, organisational, network, and entrepreneurial – in examining the internationalisation of firms from emerging markets. The findings indicate that business networks are indeed strategic mechanisms for a firm in developing its internationalisation trajectory, as hypothesised.

The results of this research suggest that studies based on the business-network model of internationalisation can no longer ignore the impact of other factors at the contextual, organisational, and entrepreneurial level. Incorporating these elements into research that seeks to explain the internationalisation of firms could provide a more sophisticated understanding through new insights and allow scholars to go beyond one-dimensional and static theorising.

Keywords:

Internationalisation; Business Networks; Software Industry; Emerging Markets; Brazil

Acknowledgements

Even though to the researcher a doctoral thesis seems at times a lonely intellectual endeavour, it is basically a collective process to which many others make vital contributions. Mine is no exception. Without the contributions acknowledged below, it could never have been completed.

On the Bradford side, I owe great debts of gratitude to my supervisor, Professor Hafiz Mirza, for his intellectual guidance during this project. Professor Deli Yang, my second supervisor, deserves a special acknowledgement for her commitment to me as a doctoral student over the years, providing insights and being always so supportive and available. My grateful appreciation also goes to Chris Barkby, PhD administrator, who provided continual support during all these years.

On the Brazilian side, I am deeply grateful to Sebrae, the Brazilian Support Service for Micro and Small Enterprises – the institution I have worked with for the last twenty-six years – for providing me with many opportunities for career development, and in particular, for granting the scholarship which made my doctoral studies possible. I would like to thank especially Sérgio Moreira, former President of Sebrae, for his enthusiastic support for my PhD project since its inception.

Sincere thanks are due to Sávio Ramos, from Sebrae in the State of Amazonas, and to colleagues from several other Sebrae State branches across the country, for their friendly assistance during the data collection stage. At Sebrae headquarters, special thanks go to Monica Caribé, Nídia Caldas, and Sandro Servino. Warmest thanks as well to former colleagues Edjair Siqueira, Maria Palhares, Luis Augusto Pacheco, Gustavo Morelli and Wolney Martins.

I would like to convey my gratitude also to: Célia Joseli do Nascimento, of the Ministry of Science and Technology (MCT), for access to the Ministry's database of software companies; Djalma Petit and Dr. Giancarlo Stefanuto, of the Society for the Promotion of Excellence in Brazilian Software (SOFTEX); and Dr. Paulo Veras of TecSoft – who all helped me to gain a deeper understanding of the software industry in Brazil.

My special appreciation goes to Dr. Bruno Campello de Souza, of the Federal University of Pernambuco (UFPE), and Dr. John Miles for their most valuable contributions during several stages of the thesis.

My gratitude is especially strong to the entrepreneurs of 148 Brazilian software firms who took part in this study, believing that the research would be of some use to the progress of their industry.

I must thank the following friends for providing help, suggestions, and constant encouragement: Silvia Asfora, a dear friend who became a sister in my life; Dr. Gonzalo Shoobridge; Dr. Stephanie Hussels; Dr. Claudio and Dr. Hanna De-Mattos; Stella and Dr. Darwin Liang; Peter and Jean Smith, Dr. Alweena Zairi; and Dr. Axèle Giroud, senior lecturer at The School of Management at Manchester University, my former second supervisor.

Finally, I am deeply grateful to my parents, Joserita and Joaquim Alfredo Rossiter (in memoriam), for teaching me, and inspiring me, since my earliest years, to reach my goals; to my husband Marcelo Lima Costa, for being a constant source of love, humour and encouragement, as well as for exerting the pressure sometimes needed to keep me on track to completion; and to my three children Priscila, Vitor and Marcela, for their understanding, patience, and support during those long and very busy years as a part-time doctoral researcher. Although my research journey was long, it was indeed a worthwhile and unforgettable experience.

Above all, I owe this achievement to God, who is faithful and has blessed me in life much more than I ever thought possible.

“It is a great thing to have received a particle of wisdom from heaven, the gift of finding the relationship of things, the faculty of comparing them, and the talent for drawing a conclusion!”
Brazilian writer Machado de Assis, in *“The Posthumous Memoirs of Brás Cubas”*, 1881.

Raissa Rossiter

Brasília, Brazil, February 2011.

Dedicated to my husband,

Marcelo

Table of Contents

Abstract	ii
Acknowledgements.....	iii
Table of Contents	vi
List of Tables	ix
List of Figures	xi
1. Chapter 1: Introduction.....	14
1.1 Research Context	16
1.1.1 The Importance of the Software Industry in Brazil	17
1.1.2 The Internationalisation of Firms from Emerging Economies.....	17
1.1.3 Networks in the Internationalisation of High-Tech Firms	19
1.1.4 The Need for an Integrative Theoretical Approach	20
1.2 Research Gaps	21
1.3 Research Objectives and Questions	23
1.4 Research Methodology	25
1.5 Overview of the Thesis.....	25
2. Chapter 2: The Software Industry	29
2.1 Introduction	29
2.2 The Software Industry	29
2.2.1 The Software Industry in the Global Economy.....	29
2.2.2 New Exporting Nations in the Global Software Industry.....	34
2.3 The Software Industry in Brazil.....	39
2.3.1 The Institutional and Regulatory Environment	42
2.3.2 The Brazilian Software Industry Supply Chain.....	53
2.3.3 The Dynamics of the Brazilian Software Industry	59
2.4 Concluding Remarks.....	66
3. Chapter 3: Literature Review, Conceptual Framework and Hypotheses. 68	
3.1 Introduction	68
3.2 Definition of Internationalisation	69
3.3 Review of Internationalisation Research.....	70
3.3.1 Streams of Research following Economics Perspectives	78
3.3.2 Streams of Research following Behavioural Perspectives.....	81
3.4 Determinants of Internationalisation	101

3.4.1	Dimensions of the Framework and Hypotheses	103
3.5	Concluding Remarks	134
4.	Chapter 4: Methodology	137
4.1	Introduction	137
4.2	Research Philosophy	138
4.3	Research Approach and Method	142
4.4	Research Strategy	144
4.5	Research Tactics	147
4.5.1	Sampling Process and Sample Design	147
4.5.2	The Design of the Questionnaire	151
4.5.3	Pilot Study: Pre-test of the Questionnaire	159
4.6	Development, Operationalisation and Measurement	167
4.6.1	Development and Operationalisation	168
4.6.2	Measurement of Constructs: Reliability and Factor Analysis	184
4.6.3	Comparison between Exporters and Importers	187
4.6.4	Data Processing and Analysis	189
4.7	Analytical Techniques	191
4.8	Sample Characteristics	196
4.9	Concluding Remarks	214
5.	Chapter 5: The Determinants of Exports by Software Firms	215
5.1	Introduction	215
5.2	Analysis of the Overall Sample	216
5.2.1	Assessment of Logistic Models of the Overall Sample	219
5.2.2	Hypotheses Testing	227
5.2.3	Overview of Overall Sample Results	233
5.3	Analysis of Sample Sub-Groups	234
5.4	Concluding Remarks	242
6.	Chapter 6: The Determinants of Imports by Software Firms	244
6.1	Introduction	244
6.2	Analysis of the Overall Sample	245
6.2.1	Assessment of Logistic Models of the Overall Sample	247
6.2.2	Hypotheses Testing	255
6.2.3	Overview of the Overall Sample Results	261
6.3	Analysis of Sample Sub-Groups	262
6.4	Concluding Remarks	269
7.	Chapter 7: Multidimensional Scaling	271
7.1	Introduction	271
7.2	Purpose and Choice of Multidimensional Scaling	272
7.3	Interpretation of MDS Configurations	276
7.4	The Application of MDS in this Study	281
7.5	Split-Sample Results	293

7.6	Concluding Remarks.....	319
8.	Chapter 8: Discussion and Conclusions	321
8.1	Introduction	321
8.2	Findings on Research Questions	322
8.2.1	The extent of Internationalisation of Brazilian Software Firms	323
8.2.2	The Impact of Business Network Collaboration Strategies	329
8.2.3	Network Factors Explaining Software Firms' Internationalisation.....	330
8.2.4	Combined Effect of Factors.....	333
8.2.5	Differences between Smaller and Larger Software Firms	343
8.2.6	An Overview of Research Findings	351
8.3	Research Contributions.....	358
8.3.1	Empirical Contributions	362
8.3.2	Theoretical Contributions	362
8.3.3	Methodological Contributions	365
8.4	Implications for Policy and Business Practice.....	366
8.5	Research Limitations and Future Research Directions.....	371
	References	375
	Appendices.....	403
	Appendix A: The Study Web Page (Portuguese Language).....	403
	Appendix B: Cover Letter (English Language Version)	404
	Appendix C: Survey Instrument (English Language Version)	405
	Appendix D: Cover Letter (Portuguese Language Version).....	413
	Appendix E: Survey Instrument (Portuguese Language Version).....	414
	Appendix F: Constructs of the Study.....	422

List of Tables

Table 2.1: Global Software Industry Output in 2004	33
Table 2.2: A Taxonomy of the World's Software Exporting Countries	36
Table 2.3: Review of Studies of the Brazilian Software Industry	40
Table 2.4: Phases of Policy Measures in the Brazilian Software Industry	47
Table 2.5: Software Firms in Brazil: Average Values in R\$ (2002)	62
Table 2.6: Key Characteristics of the Brazilian Software Industry	64
Table 3.1: An Assessment of Internationalisation Research: Selected Reviews	72
Table 3.2: Themes in Network Research	95
Table 3.3: Summary of Hypotheses of the Study	133
Table 4.1: Philosophical Perspectives on Social Research	141
Table 4.2: Assessment of Sources for the Establishment of Sampling Frame	149
Table 4.3: Overview of Pilot Study Companies	160
Table 4.4: Debriefing Interview for Pilot Study	161
Table 4.5: Time Frame for Questionnaire Design and Administration	163
Table 4.6: Summary of the Survey Response	164
Table 4.7: Comparison between Early and Late Respondents	166
Table 4.8: Measurement of Explanatory Variables	171
Table 4.9: Alpha Coefficients of Multi-item Scale Constructs of this Study	185
Table 4.10: Suitability of Factorial Design: KMO Test Results	187
Table 4.11: Means of Study Constructs and Mann-Whitney U Test	188
Table 4.12: Descriptive Statistics and Pearson's Correlation Matrix	195
Table 4.13: Ownership Structure of Firms Surveyed	196
Table 4.14: Frequency Distribution - Exporting versus Importing	202
Table 4.15: Descriptive Statistics for Imports and Exports (2003-2005)	209
Table 4.16: Foreign Languages Spoken by Respondents (n=147)	212

Table 5.1: Spearman Correlation of Selected Constructs and Exports	218
Table 5.2: Determinants of Exports: Logistic Regression Results	226
Table 5.3: Determinants of Exports: Logistic Regression Results by Sub-Groups	238
Table 6.1: Spearman Correlation of Selected Constructs and Imports	247
Table 6.2: Determinants of Imports: Logistic Regression Results.....	254
Table 6.3: Determinants of Imports: Logistic Regression Results by Sub-Groups	265
Table 7.1: Assessment of Stress Values for MDS Solutions of Constructs.....	280
Table 7.2: Stress Values for MDS Solutions (Exporters and Non-Exporters)	294
Table 7.3: Stress Values for MDS Solutions (Importers and Non-Importers).....	295
Table 8.1: Summary of Empirical Results: Sample Sub-Groups	350
Table 8.2: Summary of Empirical Results: Findings vs. Hypotheses (Overall Sample)	357
Table 8.3: Summary of Main Findings.....	359

List of Figures

Figure 1.1: Overview of the Thesis.....	26
Figure 2.1: The Supply Chain in the Brazilian Software Industry.....	54
Figure 3.1: A Model of Business Networks.....	89
Figure 3.2: Integrative Theoretical Framework of the Study	102
Figure 4.1: Critical Realist View and Ontological Levels Applied to this Study.....	143
Figure 4.2: Comparison of Two Samples of Software Firms in Brazil	167
Figure 4.3: Distribution of Number of Employees.....	197
Figure 4.4: Distribution of Firms by Size.....	197
Figure 4.5: Main Areas of Activity of Firms.....	198
Figure 4.6: Sales Volumes by Products/Services.....	199
Figure 4.7: Distribution of Years of Operation	200
Figure 4.8: Geographical Distribution of Responding Firms in Brazil.....	201
Figure 4.9: Proportion of Firms that Imported vs. Exported	202
Figure 4.10: Proportion of Firms that Exported vs. Imported	203
Figure 4.11: Boxplot – Imports and Exports in 2005 by Size of Firms	204
Figure 4.12: Distribution of Firms by Age at First international Sale (n=29)	205
Figure 4.13: Planning Approach to Internationalisation (n=46)	206
Figure 4.14: Distribution of Modes of International Representation	207
Figure 4.15: Boxplot – Sales to International Markets/Regions	208
Figure 4.16: Age Distribution of Respondents.....	211
Figure 4.17: Educational Levels of Respondents	211
Figure 4.18: Position of Respondents	213
Figure 7.1: MDS Representation of Institutional Connectedness.....	282
Figure 7.2: MDS Representation of External Constraints for International Operations	283

Figure 7.3: MDS Representation of Trust.....	285
Figure 7.4: MDS Representation of Governance Mechanisms	286
Figure 7.5: MDS Representation of Networking Competences	288
Figure 7.6: MDS Representation of International Entrepreneurial Orientation	289
Figure 7.7: MDS Representation of International Experiential Knowledge.....	292
Figure 7.8: MDS Representation of Institutional Connectedness (Exporters)	296
Figure 7.9: MDS Representation of Institutional Connectedness (Non-Exporters)	297
Figure 7.10: MDS Representation of Institutional Connectedness (Importers)	297
Figure 7.11: MDS Representation of Institutional Connectedness.....	298
(Non-Importers)	298
Figure 7.12: MDS Representation of External Constraints for International Operations (Exporters).....	299
Figure 7.13: MDS Representation of External Constraints for International Operations (Non-Exporters)	300
Figure 7.14: MDS Representation of External Constraints for International Operations (Importers).....	300
Figure 7.15: MDS Representation of External Constraints for International Operations (Non-Importers)	301
Figure 7.16: MDS Representation of Trust (Exporters)	302
Figure 7.17: MDS Representation of Trust (Non-Exporters).....	303
Figure 7.18: MDS Representation of Trust (Importers).....	303
Figure 7.19: MDS Representation of Trust (Non-Importers).....	304
Figure 7.20: MDS Representation of Governance Mechanisms (Exporters)	305
Figure 7.21: MDS Representation of Governance Mechanisms (Non-Exporters) .	306
Figure 7.22: MDS Representation of Governance Mechanisms (Importers).....	306
Figure 7.23: MDS Representation of Governance Mechanisms (Non-Importers) .	307
Figure 7.24: MDS Representation of Networking Competences (Exporters)	308
Figure 7.25: MDS Representation of Networking Competences (Non-Exporters)	309

Figure 7.26: MDS Representation of Networking Competences (Importers)	309
Figure 7.27: MDS Representation of Networking Competences (Non-Importers). 310	
Figure 7.28: MDS Representation of International Entrepreneurial Orientation (Exporters)	313
Figure 7.29: MDS Representation of International Entrepreneurial Orientation (Non- Exporters)	313
Figure 7.30: MDS Representation of International Entrepreneurial Orientation (Importers)	314
Figure 7.31: MDS Representation of International Entrepreneurial Orientation (Non-Importers)	314
Figure 7.32: MDS Representation of International Experiential Knowledge (Exporters)	317
Figure 7.33: MDS Representation of International Experiential Knowledge (Non- Exporters)	317
Figure 7.34: MDS Representation of International Experiential Knowledge (Importers)	318
Figure 7.35: MDS Representation of International Experiential Knowledge (Non- Importers)	318

Chapter 1: Introduction

This thesis aims to examine key determinants of the internationalisation of software firms in Brazil. Linked to globalisation trends, the internationalisation of firms has become an established field of investigation within the international business-studies domain (Coviello and McAuley, 1999; Knight, 2001; Bell et al., 2004; Spence and Crick, 2006; Zhu et al., 2006; Knowles et al., 2006; Agndal and Chetty, 2007; Lloyd-Reason and Sear, 2007; Ojala, 2008; Ojala, 2009).

The literature suggests that business-network collaboration represents a strategic instrument for firms, especially of smaller size, that seek to grapple with the complexities of international operations and become active in foreign markets (Bernal et al., 2002; Chetty and Wilson, 2003; Gemser et al., 2004; Crick and Spence, 2005; George et al., 2005; Loane and Bell, 2006; Agndal and Chetty, 2007; Fink et al., 2008). However, empirical evidence on the effects of collaborative-network relationships on the internationalisation of firms is scarce in emerging-market economies, as Liu et al. (2008) emphasise.

In this study, recognising the importance of business networks¹ for the internationalisation of firms, an integrative framework is developed and tested through empirical analysis of survey data to provide a better understanding of the phenomenon.

¹Business networks are defined in this study as an intentionally created and organised collaboration between two or more actors (firms or institutions) which goes beyond a specific task, with the purpose of achieving a common objective.

The study focuses on firms in a highly innovative and fast-growing global industry, the software industry, which plays a critical role in both developing and developed countries, some of which have become active in software export markets. Given the reliance of a wide range of economic activities, goods, and services on software technologies, the contribution of the software industry to economic performance and international competitiveness has been acknowledged (OECD, 2009). Moreover, a study by OECD (2009, p. 9) shows that software investment has contributed to GDP growth in all of the member countries and time periods for which data are available.

Although the Brazilian software sector – the seventh largest in the world - has demonstrated its economic importance, its level of internationalisation remains low, a fact attributed to several factors that have not been fully addressed in an integrated manner in previous studies (Botelho et al., 2005; Roselino, 2006a). Thus the choice of a knowledge-based industry such as the software and allied services as the target industry in this study is grounded on its relevance to both the local and global economy and its resulting potential for public policy and advancements in the international business research agenda.

The objective of this chapter is to demonstrate the relevance of the research problem to the international business literature as well as how this study goes about addressing it. The chapter begins by providing the research context, followed by an outline of the gaps in internationalisation research. A statement of research objectives and an outline of the specific questions pursued in the investigation are then developed, after which the

research methodology is briefly explained. The chapter ends with an annotated overview of the thesis structure.

1.1 Research Context

The international connectedness of markets for goods, services, finance, labour, and information, and the interdependence of national economies strongly affect the ability of firms, especially those operating in high-technology sectors, to remain competitive in marketplaces increasingly characterised by foreign and/or global competition (Ruzzier et al., 2006).

This suggests that a firm's successful involvement in international markets might enhance its competitive position within its domestic market as well, especially in highly competitive domestic markets in which global players operate as in the case of Brazil's software market. For example, a comparative study by Spence and Crick (2006) on the internationalisation of Canadian and UK high-tech small and medium-sized enterprises (SMEs) provides empirical evidence of a "spill-over" effect of overseas sales leading to domestic market opportunities, due to the reputation gained in the lead market. Conversely, some studies show that when firms fail to internationalise their operations they may lose their competitiveness in domestic markets (George et al., 2005). This reasoning therefore sets forth the potential importance of internationalisation for the survival and successful growth of firms, especially of smaller size.

1.1.1 The Importance of the Software Industry in Brazil

The software industry is widely acknowledged for its role in the expansion of post-industrialised economies, driving innovation processes, contributing to economic growth, and impacting on virtually all other industries that need to succeed in a globalised marketplace. It can be argued that perhaps no other single industry has played such a critical role within the knowledge-based economy as the software industry (Arora and Gambardella, 2004; Roselino, 2006a).

Undoubtedly, the software industry also plays a significant part in the overall development thrust of the Brazilian economy, demonstrating its potential in regard to sales and job creation, as Botelho et al. (2005) assert. Statistics show that micro, small and medium-sized enterprises constitute the majority of companies in the software sector, the most important information technology (IT) sector in the country since the 1990s (see Section 2.3). Yet, in spite of the overall level of competitiveness of the Brazilian software industry, significant disparities exist between large foreign firms and domestic firms. For example, of export revenues of US\$ 81.6 million by software firms operating in Brazil in 2002, 95 percent was achieved by large foreign firms, as Roselino (2006a) asserts (see Section 2.3.3). These aspects will be explored in more detail in the next chapter.

1.1.2 The Internationalisation of Firms from Emerging Economies

With the emergence of large developing economies in the global landscape such as the so-called BRIC countries (Brazil, Russia, India, and China), there is a need to address and empirically test the important

phenomenon of the internationalisation of firms from an emerging country's perspective (Yiu et al., 2007). In regard to China and India, this research gap is rapidly being filled, as the number of scholarly articles on these two countries has increased sharply with the strong interest in their role within the global economy (Young et al., 1998; Contractor and Kundu, 2004; Buckley et al., 2006; Elango and Pattnaik, 2007; Deng, 2007; Yiu et al., 2007; Cheng and Yu, 2008; Liu et al., 2008; Pangarkar, 2008).

In contrast however, while Brazil, with the tenth largest GDP in the world (World Bank, 2008), remained the largest FDI recipient in Latin America and the Caribbean Region in 2009 as well as the region's main foreign investor, according to the World Investment Report (UNCTAD, 2010) – strong evidence of the international character of its economy - little is known about the internationalisation of Brazilian software firms. More specifically, no comprehensive study has been conducted to capture the impact of business-network collaboration on the internationalisation of Brazilian software firms until now.

Evidence from other studies supports the idea that although the shares of developing and transition economies in global FDI are still small, they will continue to rise over the next years (UNCTAD, 2010). Thus important challenges are still to be met by firms, especially of smaller size, in emerging markets. It has been noted that fundamental and comprehensive changes in institutional environments such as outward-oriented export-led and other government policies are being introduced in many emerging economies which can contribute to the consolidation of domestic firms at home and their further outward expansion (Zhu et al., 2006; UNCTAD,

2010). For example, with the launch of Brazil's guidelines and strategies set forth by the Industrial, Technological and Foreign Trade Policy (PITCE), in 2003, the internationalisation theme was brought back to the centre of the Brazilian governmental agenda (Arbix et al., 2004).

1.1.3 Networks in the Internationalisation of High-Tech Firms

In the context of fast changing global environments, the crucial importance of existing networks has been regarded as instrumental for firms operating in internationalised high-tech markets (Jones, 1999; Crick and Spence, 2005; Agndal and Chetty, 2007; Ojala, 2008; Ojala, 2009). In a qualitative study that focus on the internationalisation of UK high-tech small and medium-sized enterprises, Spence and Crick (2005, pp. 170-171) assert:

"The use of networks through the establishment of long-term relationships is instrumental in firms' development of international business activities, generally based on commitment and trust, because of greater geographic and psychological distances between buyers and sellers or partners. The establishment of these relationships often takes place within personal or business networks which act as communication infrastructures where common interests are shared."

With growing impetus since the late 1990s, many studies have indicated the importance of networks to the internationalisation of firms in developed economies such as Australia (Hadley and Wilson, 2003; Loane and Bell, 2006), Canada (Loane and Bell, 2006), Finland (Holmlund and Kock, 1998; Haahti et al., 2005; Ojala, 2008; Ojala, 2009), Ireland (Loane

and Bell, 2006), New Zealand (Coviello and Munro, 1995; Coviello and Munro, 1997; Chetty, 1999; Hadley and Wilson, 2003; Loane and Bell, 2006; Agndal and Chetty, 2007), Norway (Haahti et al., 2005; Solberg and Durrieu, 2006), Sweden (Agndal and Chetty, 2007) and the United Kingdom (Crick and Spence, 2005). Evidently though, existing body of research on internationalisation still remains focused on firms from developed countries.

More specifically, there is only limited empirical evidence about the impact of business-network collaboration on the internationalisation of Brazilian firms in a high-tech industry such as software and allied services, as no comprehensive study has been done until now. Given its overall contribution to economic growth and its strategic importance for both developed and emerging economies, as the discussion in Chapter 2 aims to demonstrate, the software industry is the focal industry of this study.

1.1.4 The Need for an Integrative Theoretical Approach

In international business research some studies have treated exports as synonymous with internationalisation, but numerous others have provided evidence for the much more complex nature of this latter phenomenon. While exporting may be regarded as the most utilised method of foreign-market servicing, especially by firms of smaller size, the concept of internationalisation encompasses a multitude of aspects (see Section 3.2).

In fact, available literature indicates that, beyond the traditional exporting route, internationalisation may cover a range of international inward activities such as imports, technology transfer, and other linked forms of international behaviour which are increasingly important, representing

ways to strengthen the position of SMEs in competitive business environments, both in domestic and in foreign markets (Korhonen et al., 1996; Bjorkman and Kock, 1997; Buckley and Mirza, 1997; Stahl, 2000; Fletcher, 2001; Karlsen et al., 2003; ENSR - European Network for SME Research, 2003; Liu et al., 2008).

Furthermore, researchers in the internationalisation field have argued that internationalisation is too complex, dynamic, and broad to be explained by using any single theory (Bell and Young, 1998; Coviello and McAuley, 1999; Crick and Jones, 2000; Loane and Bell, 2006; Spence and Crick, 2006) or by using only outward forms of internationalisation (Korhonen et al., 1996; Fletcher, 2001; Karlsen et al., 2003). Hence these authors call for an integrative approach on the premise that it is more appropriate for understanding the international involvement of firms.

What is lacking is a satisfactory integrative model that can assist both academics and policy makers in the understanding of a broad range of factors which, combined, may impact the internationalisation of firms (Coviello and McAuley, 1999; Rialp et al, 2005; Ruzzier et al., 2006; Aspelund et al., 2007). The author of this thesis attempts to bring together several factors by designing an integrative and consistent framework to examine and close these research gaps.

1.2 Research Gaps

In light of the current state of research, it is possible to identify several gaps in the internationalisation stream of research, reflecting important issues which still have not been addressed sufficiently. First, as mentioned

previously, the bulk of research on internationalisation remains focused on firms in developed countries. Our understanding would be enriched by investigating factors affecting the international behaviour of firms in emerging countries, where firms are exposed to distinct competitive pressures and institutional environments. Second, despite the massive body of research on the internationalisation of firms, one of the important gaps that some researchers in the internationalisation field point to is that scholars have given far more attention to outward international operations, particularly through exporting, and not adequate attention to other aspects of inward-outward relationships at different stages of internationalisation (Korhonen et al., 1996; Karlsen et al., 2003). Given this, it seems appropriate to investigate inward international operations as an important element for the eventual outward international move. Third, the potential influence of network relationships on the internationalisation process of firms has mainly been investigated using qualitative research on small samples of firms, as Jones (1999) points out, leaving a gap in terms of more generalisable explanations (see Section 4.3). As a consequence, a lack of comprehensive empirical data on the extent and significance of this phenomenon has limited theoretical explanations and thus has limited the usefulness of these findings for policy-making purposes. Finally, a gap exists in terms of examining the issues in a truly integrative way. These issues will be more fully discussed in Chapter 3.

1.3 Research Objectives and Questions

The basic assumption underlying this research is that firms are embedded in networks of relationships. The research thus adopts the network perspective as its main analytical tool and attempts to develop an interdisciplinary and integrative approach, by seeking insights from often separate domains and combining factors at four dimensions: (1) contextual; (2) network; (3) organisational; and (4) the individual entrepreneur.

The complementarities of distinct theoretical perspectives will be addressed in light of the network paradigm, providing a more holistic understanding of the complex phenomenon of collaboration in the internationalisation processes of firms. Through examining statistically the likelihood of internationalisation within the software and allied services sector, in terms of both exports and imports, and to what extent it can be explained by business-network collaboration and other relevant factors, this study challenges anecdotal evidence.

The three main objectives of this study will be:

(1) To build, and test empirically, an integrative theoretical framework for analysing internationalisation processes, especially in the context of Brazilian software firms, thus eventually offering scope for extension or re-formulation of existing theoretical explanations;

(2) To examine the impact of business-network collaboration on the internationalisation processes of Brazilian software firms; and

(3) To gain a better and deeper understanding of the collaboration strategies of software firms in their internationalisation in the context of

emerging-market countries, specifically through empirical evidence of such firms in Brazil.

With regard to these aims, the following central research question is addressed:

Central Research Question:

To what extent, and in what ways, does business-network collaboration impact on the internationalisation of software firms in emerging countries?

This overall question can be subdivided into four specific research questions:

Research question 1: *What is the extent of internationalisation of Brazilian software firms?*

Research question 2: *To what extent is the internationalisation of Brazilian software firms driven by collaboration through business networks?*

Research question 3: *What are the factors that explain the effect of business networks on Brazilian software firms' internationalisation?*

Research question 4: *Can factors related to the four dimensions examined in this study² be used to explain differences in the internationalisation of software firms?*

²See section 1.3.

1.4 Research Methodology

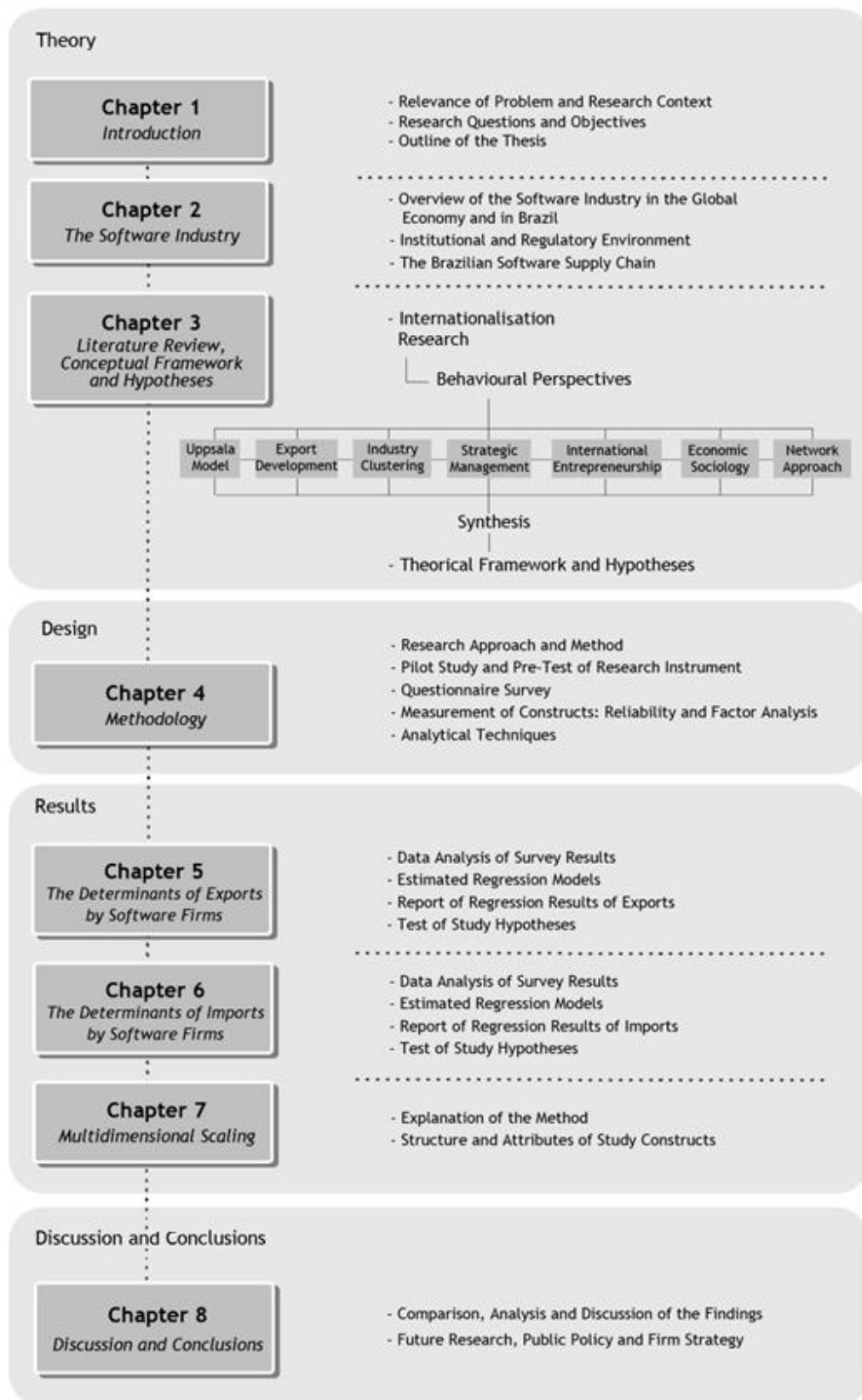
The research methodology adopted for this research is within the realist philosophical paradigm and employs a quantitative method to answer the research questions and to collect primary data. Hence, in examining the determinants of the internationalisation of software firms in Brazil, through engagement in both exports and imports, a survey method through a self-administered mail questionnaire for data collection was chosen for the empirical investigation (see Sections 4.3 and 4.4).

In a pilot test of the questionnaire, face-to-face interviews were conducted with business owners of 10 software firms during which they were asked to assess the research instrument for comprehensiveness and adequacy to the study's objectives and population. The questionnaire was modified based on their comments. A nationwide mail survey of business owners or top-level executives was then undertaken on 16th November 2005, yielding a representative sample of 148 Brazilian software companies, providing a response rate of 12.5 percent. While preliminary analyses of the data are based on statistical techniques such as Spearman's correlation and other statistical tests such as Mann Whitney U, logistic regression analysis was chosen for the test of the research hypotheses. In addition, the multidimensional scaling (MDS) method was applied to provide further insights into the structure of the survey data.

1.5 Overview of the Thesis

This thesis consists of eight chapters. An overview of the thesis, chapters, and linkages is provided in Figure 1.1.

Figure 1.1: Overview of the Thesis



Following the present introduction, Chapter 2 provides a preliminary analysis of the international context as well as the current situation of the software industry in Brazil. Chapter 3 reviews the major schools of internationalisation research, with particular attention to behavioural perspectives. Through the review of the existing literature, the chapter emphasises the network approach as the overriding logic and main analytical tool of this study. After reviewing the extant literature, the chapter presents the integrative theoretical framework and the hypotheses developed in this research to examine the determinants of software firms' exports and imports.

Chapter 4 covers the research design. This chapter discusses the methodological aspects of the empirical part of this study as well as including descriptive statistics of the 148 Brazilian software firms participating in the study. Attention is paid to the rationale for the quantitative approach and for the selection of the survey method to collect primary data with which to test the theoretical framework and the hypotheses of this study. In addition, the survey administration is reviewed.

The results of the empirical part of the study, a survey research, are described in Chapters 5, 6, and 7. Using the theoretical framework adopted in this study, Chapters 5 and 6 provide the results of the logistic regression analyses which were applied for testing the research hypotheses about what determines whether software firms export and import, respectively. Chapter 7 presents the results of the application of the multidimensional scaling (MDS) method used to provide a supplemental understanding of the underlying attributes that describe the sets of variables for important constructs

investigated within the present work. This analysis is enhanced by comparing the results for two-distinct sub-samples of respondent firms.

Finally, Chapter 8 is devoted to the conclusions of the study. The outcomes provided in previous chapters are discussed and used to provide answers to the research questions and the hypotheses posed. The chapter also outlines the conclusions, contributions, implications and limitations of the study, and offers suggestions for further research.

Chapter 2: The Software Industry

2.1 Introduction

The objective of this chapter is to examine the broad characteristics of the software industry in Brazil, chosen as the target industry to conduct the empirical part of this research. Based on secondary data, it analyses the general national context in order to help understand the specific case of Brazilian software enterprises upon which this study focuses.

The chapter first provides a brief analysis of the software industry in the global economy as well as in emerging economies such as Brazil (Section 2.2). Section 2.3 then reviews the software industry in Brazil, with particular attention to the institutional and regulatory environment that shapes software activities in the country as well as the dynamics which prevail in the industry. Furthermore, the nature of the supply chain in the Brazilian software industry is examined. Special emphasis is placed on internationalisation and what constitutes imports and exports in the Brazilian software industry. The chapter ends with some concluding remarks in Section 2.4.

2.2 The Software Industry

2.2.1 The Software Industry in the Global Economy

More than four decades old, the origins of the software industry can be traced back to the 1960s, to the development of the computer industry in

the United States. Software was the necessary counterpart to computer hardware and became increasingly essential as the basis for intuitive, easy-to-use interfaces between humans and machines. With the rise of the personal computer (PC) in the early 1980s, the growth of the market for computer and software services, standard packaged software, systems and applications, together with the increased demand for large-system integrators in the 1990s, the international spread of the computer software and services industry increased dramatically (UNCTAD, 2002). In the 1990s, the phenomenon of the Internet and electronic commerce introduced further changes in business practices and in the way different software products, including embedded, packaged, and tailored systems, were marketed, both in domestic and foreign markets (Alajoutsijärvi et al., 2000).

Previous research indicates that a common feature of the software industry is its high fragmentation and the predominance of small entrepreneurial firms, forcing its members to establish strategic alliances in order to remain competitive in the global marketplace (Bell, 1997; Alajoutsijärvi et al., 2000; Nowak and Grantham, 2000; Barrett, 2001). According to Correa (1996, p. 173) certain characteristics of the software industry such as economies of scale, and, at the same time, relatively low technological and capital barriers to entry, permit the coexistence of a few dominant large firms – particularly in systems software and horizontal packages – with a great number of small firms competing on the basis of product differentiation.

Based on definitions given by several authors (Sawyer, 2000; Stefanuto, 2004; Roselino, 2006a; Ojo et al., 2007), software products, in the

context of this study, fall into four categories: bespoke software³, customised software⁴, packaged software⁵, and embedded software⁶; while software services can be related to outsourcing (of personnel, equipment, systems, etc), and to the typical software development lifecycle: from specification and analysis, through design and implementation, to testing and maintenance. Software services also include data entry and other software-intensive IT services that can also be further classified as low and high added value.

The software industry, considered as part of the Information and Communication Technologies (ICT) sector, reveals a greater prevalence of smaller firms than other ICT sectors such as communications equipment and systems, electronics and components, and IT services; and is also regarded as one of the most dynamic ICT sectors (OECD, 2004). Furthermore, although a variation across countries can be observed, the industry's overall contribution to economic growth and to greater labour productivity on both supply and use sides has been acknowledged at the sectoral and firm levels, especially for smaller companies (OECD, 2004). Since the developments mentioned above, the world's software market has been one of the fastest growing markets in the last few decades, in particular in the 1990s, replacing the vertically-integrated mainframe computer industry structure by a horizontally specialised one (Dedrick et al., 2001; Arora and Gambardella, 2004; Commander, 2005; Ojo et al., 2007).

³ Bespoke software encompasses all major stages of the software development lifecycle, from planning, design, specification, to implementation, testing and documentation. Typically involves high-value services (Roselino, 2006a).

⁴ Customised software can be defined as those made by either an organisation's internal staff or by direct subcontract to a software house. That is, customised software is a made-to-order system and is typically built for specific users (Sawyer, 2000).

⁵ Packaged software can be defined as all software sold as a tradable product (purchased from a vendor, distributor or store) for all computer platforms including mainframes, workstations and microcomputers. Typically, packaged software is licensed for use (Sawyer, 2000).

⁶ Embedded software can be defined as software that is designed and integrated into a larger software program or equipment, without which it would not perform its specific tasks (Stefanuto, 2004).

The global software industry is dominated by the United States and European Union member states. To illustrate this dominance, it is estimated that, as of 2004, the world software industry was worth US\$783 billion, with US and EU countries accounting for 40 percent and 30 percent of this figure respectively (Ojo et al., 2007, p. 4). Also, studies indicate that 90 percent of the world's exports in software originate from the US and Europe (McManus and Floyd, 2005, p.26). The software industry has nevertheless become increasingly globalised in the last two decades, driven by firms' need to access markets, skills, and technologies internationally (OECD, 2004).

As some authors note (Heeks et al., 2000; McManus and Floyd, 2005; Bardhan and Kroll, 2006), the globalisation of the software industry has been encouraged by cost-reduction and other practical benefits (including the ability to carry out 24/7 operations) arising from overseas outsourcing and offshore- affiliate production of software. Offshoring of IT goods and services has expanded globally in such a way that it has been estimated that the IT software and service jobs displaced from the U.S., as of 2003, were over 104,000, including not only jobs eliminated by American companies but also jobs that were never created as US firms expanded activities using offshore resources (McManus and Floyd, 2005).

Benefiting from first-mover advantages, United States multinational companies (MNCs), in particular Microsoft, have technological leadership within the industry and take a dominant position in the world market (Arora and Gambardella, 2004). Studies reveal that Microsoft and Oracle are within the list of the top 10-15 software companies both in China and Brazil, playing

a major role as industry suppliers (Arora and Gambardella, 2004; Botelho et al., 2005).

A study conducted by DTI (2007) indicates that the top three US-based firms in standardised enterprise software (IBM, Oracle, and Microsoft) accounted for 83 percent of the world market in database management systems and for 27 percent of the global software market in 2002. Table 2.1 provides an overview of the output of the global software industry in 2004, in which it is possible to observe the prevalence of US and EU MNCs mentioned earlier.

Table 2.1: Global Software Industry Output in 2004

Rank	Region	Key Companies	Industrial Output (US\$)	Global (percent)
1	US	Microsoft, IBM, EDS Computer, Sciences Corporation, Accenture, Lockheed Martin, HP and Oracle	311.5 billion	40
2	EU	SAP, IONA, Business Objects, and Capgemini	238.2 billion	30
3	Japan	Hitachi, NEC, and Fujitsu	83.2 billion	11
4	China	China Standard, Neusoft, Kingdee, ZTE, Langchao, Baosight and CVIC Software Engineering	29.3 billion	4
5	South Korea	Haansoft and Tmaxsoft	20.7 billion	3
6	India	TCS, INFOSYS, Wipro	20 billion	3

Source: Ojo et al. (2007)

In an analysis of industry trends, Nowak and Grantham (2000) discuss radical changes in the competitive landscape for the software industry, led by three evolutionary factors. The first factor is related to technological advancements within the industry, moving from an object-oriented programming paradigm to the component-based software development

(CBSD) paradigm, with the replacement of handcrafted software by specialised domain-specific applications. The second factor brings together the globalisation of the markets and the developments in Information and Communication Technologies (ICTs), with an impact on the growth of Internet-based infrastructures as marketing and distribution channels for new software products. This will lead businesses to form strategic partnerships to achieve competitive advantage in the marketplace. The third factor to consider is the persistence of a highly fragmented industry comprised of small, niche-market entrepreneurial firms, despite a few major players, with a business model based on alliance formation and shared human resources.

In line with Nowak and Grantham, other research also indicates that a common feature of the software industry is its high fragmentation and the predominance of small entrepreneurial firms, forcing its members to establish strategic alliances in order to remain competitive in the global marketplace (Bell, 1997; Alajoutsijärvi et al., 2000). Among all the critical issues for software firms to remain competitive on a global level, Nowak and Grantham highlight human capital, both in quality and quantity, as the most important structural element for the software industry in the early 21st century – a conclusion which seems to be corroborated by several studies (Arora and Athreye, 2002; Carmel, 2003c; Arora and Gambardella, 2004; Lassila et al., 2006; Seleim et al., 2007; The Economist Intelligence Unit, 2008).

2.2.2 New Exporting Nations in the Global Software Industry

While the importance of the software industry is widely recognised in the case of developed economies such as The United States, Germany,

United Kingdom, and Japan, representing between 1 and 2 percent of gross domestic product (GDP) in these economies, recent studies also demonstrate significant growth of the industry in emerging economies such as India, Israel, Brazil and China, some of which have become active in software export markets (Heeks and Nicholson, 2002; UNCTAD, 2002; Carmel, 2003a, 2003b, 2003c; Arora and Gambardella, 2004; Contractor and Kundu, 2004; Roselino, 2006a; Ojo et al., 2007). Further, the World Investment Report (UNCTAD, 2006) draws attention to the significant increase in foreign direct investment (FDI) by highly competitive IT and software transnational corporations (TNCs) from India that have diversified their operations and investments across the world.

The path of new exporting nations towards building a competitive software industry in the global market-place has led some researchers to analyse the software export strategies of such nations and draw lessons for policy-making purposes. With this in mind, Carmel (2003a), for instance, developed the 4-Tier taxonomy shown in Table 2.2.

Table 2.2: A Taxonomy of the World's Software Exporting Countries

Tier	Threshold/boundary			Label	Countries
	Maturity	Clustering (no. of organisations)	Export revenues (US\$)		
1	>15 years	Hundreds	> \$1 billion	Major software exporting countries	Mostly OECD countries such as: USA, Canada, UK, Germany, France, Belgium, Netherlands, Sweden, Finland, Japan, Switzerland, Australia. Includes entrants from the 1990s: Ireland, Israel, and India
2	>10 years	100	> \$200 million	Transition software exporting countries	Only Russia and China
3	>5 years	Tens	> \$25 million	Emerging software exporting countries	Brazil, Costa Rica, Mexico, Philippines, Malaysia, Sri Lanka, Korea, Pakistan, Romania, Bulgaria, Ukraine, Poland, Czech Republic, Hungary, Estonia, Latvia, Lithuania, Chile, Argentina, Thailand, South Africa.
4	-	-	-	Infant stage software exporting countries	Cuba, El Salvador, Jordan, Egypt, Bangladesh, Vietnam, Indonesia, Iran, others.
Non- competing	-	-	-	Non- competing	Most of the (smaller, least developed) countries of the world.

Source: Carmel (2003a)

Similarly, Heeks and Nicholson (2002) developed a software-exports success model based on the experiences of India, Ireland, and Israel, the so-called “3Is”, amongst the largest software exporters shown in Table 2.2. The authors suggest that the elements of the model - (1) the nature of demand; (2) the presence of a national vision and strategy for software exports; (3) international linkages and trust; (4) industry characteristics; and (5) a supportive domestic infrastructure – should be considered for the

assessment of the performance and potential of other developing nations. Thus, it appears that national vision and strategy incorporated into government policies are likely to have influenced the international performance of many successful software firms in the “3Is” (Heeks and Nicholson, 2002; Arora and Gambardella; 2004).

Notwithstanding the opportunities for an export-oriented software industry in developing countries, Correa (1996) and Carmel (2003a) point out that a gap exists between the technical possibility of developing software and the commercial viability of selling it successfully and that this might explain some emerging countries’ low current share in world software production and trade. In addition to institutional structures, a case study of the software industry in Russia by Bardhan and Kroll (2006, p. 92) also emphasises the importance of aggressive marketing and promotional activities at the firm, industry and national levels, “to recognise one’s comparative advantage as well as to make potential clients aware of it”.

Countries’ comparative advantages in the software industry can be developed in a number of ways. For example, pointing to the importance of South-South technical cooperation in software technology, a report by Ojo et al. (2007) argues that cooperation frameworks can bring social and economic benefits to the development of the software industry in developing countries that hold significant positions in the production and delivery of software and IT services, at both macro and micro levels. This cooperation can provide the basis for complementary alliances; and may affect direct investment in this sector.

This said, although some emerging economies such as Brazil, China, and India may represent a remarkable expansion of the software industry outside the core of developed nations, it seems that they remain very heterogeneous in their economic trajectories and attributes as well as in the local dynamics of the industries (Commander, 2005; Roselino, 2006a). Commander, for example, recognises common factors such as infrastructural investments in educational services and communications by the public sector as contributory elements for the growth of the software sector in these three countries, but also underlines the differing significance of network effects associated with the migration of skilled labour inside the industry, particularly for China and India.

A brief review of empirical research to date on the software industry in both developed and emerging economies indicates that although significant growth was achieved in early-entry strategies into software export markets by countries such as India, there remain important challenges to be met by countries aspiring to become players on the world stage (Heeks and Nicholson, 2002; Carmel, 2003a, 2003b, 2003c; Arora and Gambardella, 2004; Bardhan and Kroll, 2006; Roselino, 2006a). In particular, aspirants need to ensure or develop (1) an ample supply of relevant skilled and educated labour; and (2) sizeable and effective international connections and linkages. Further, as the work of Carmel (2003a, 2003b, 2003c) and Bardhan and Kroll (2006) reveals, national advantages are complex amalgams of several factors, and the establishment of a supportive institutional structure by governments can play a facilitating role in harnessing these factors.

Having outlined the software industry globally and in new exporting nations, the next sections concentrate on the software industry in Brazil, with special attention to the institutional environment and the dynamics of the industry.

2.3 The Software Industry in Brazil

This section aims to provide an outline of the software industry in Brazil. The examination of the empirical and theoretical research available to date suggests that the evolution of the software industry in the country has been shaped, since its outset, by institutional and regulatory policies which evolved from market protectionism, in the 1970s, towards liberalisation measures in the late 1990s until the 2000s.

The section demonstrates that while 96 percent of all firms operating in the software industry in Brazil are micro and small enterprises (Botelho et al., 2005), lead players in the international software market such as Microsoft, IBM, Oracle, and SAP have a widespread presence in the country with significant disparities between domestic and foreign firms being observed. Although Brazil is important as the seventh largest software market in the world, the software industry in the country differs from successful exporting nations such as India, Ireland, and Israel, in being oriented predominantly towards the domestic market. Finally, the section discusses the level of internationalisation of the Brazilian software industry in terms of export revenues, 95 percent of which are accounted for by foreign firms based in the country. This section relies to a large measure on a review of studies concerning the sector, as shown in Table 2.3.

Table 2.3: Review of Studies of the Brazilian Software Industry

Author	Area under Discussion	Type of Study	Company Size	Methodological Aspects, Data collection and Analysis Techniques
Dib (2008)	Examination of the internationalisation of Brazilian software firms and the born-global phenomenon	Empirical	Range of sizes	The study is based on primary data through the use of an online survey questionnaire to a non probabilistic sample of 79 software firms, of which 44 had followed the traditional path and 35 were born global. Quantitative analysis of data with use of binary logistic regression.
Roselino (2006a)	Analysis of the software industry in Brazil	Empirical	Industry-level analysis	The study, focused on economic aspects, analyses the Brazilian software industry, understood from a comparative approach, alongside other countries' experiences of developing significant software industries (India, Ireland and China). Use of secondary data from The database of the Annual Research of the Services Sector – PAS (2002), of the Brazilian Institute of Geography and Statistics (IBGE). Quantitative analysis of data with use of descriptive statistics.
Kubota (2006)	Analysis of the software industry in Brazil	Empirical	Industry and company-level analysis (range of sizes)	Exploratory study, including a literature review about relevant aspects of the software industry, and the use of empirical and secondary data. Field research through personal interviews with 8 firms, research institutes, software organisations and researchers. Use of secondary data from The database of the Annual Research of the Services Sector – PAS (2002), of the Brazilian Institute of Geography and Statistics (IBGE). Quantitative analysis of data with use of descriptive statistics (distribution of frequencies and percentages).
Softex (2005)	Examination of the influencing factors for Brazilian Software Firms' exports, with an emphasis on the proposition of sectoral policies	Empirical	Range of sizes, with a prevalence of medium-sized to large firms, in particular, multinationals	The study is based on primary data through the use of a survey questionnaire to a convenience sample of 30 exporting software firms, either domestic or multinational, assessed as larger exporters operating in Brazil. Use of descriptive statistics for data analysis (distribution of frequencies and percentages).

Table 2.3: Review of Studies of the Brazilian Software Industry (continued)

Author	Area under Discussion	Type of Study	Company Size	Methodological Aspects, Data collection and Analysis Techniques
Ministério da Ciência e Tecnologia – MCT (2005)	Analysis of quality and productivity characteristics of the Software Industry in Brazil	Empirical	Range of sizes	The study is based on primary data through the use of a survey questionnaire to a national probabilistic sample of 488 firms operating in Brazil. Use of descriptive statistics for data analysis (distribution of frequencies and percentages).
Botelho et al. (2005)	Analysis of the domestic route of the Brazilian software industry	Theoretical (Policy-oriented)	Industry-level analysis	The study is based on secondary data available in various sources, especially the empirical results of the study by Botelho et al. (2002)
Stefanuto (2004)	The interplay between the creation of the Softex Program and the Software Industry in Brazil in the 1990s	Empirical (Policy-oriented)	Industry-level analysis	The study comprises a literature review about relevant aspects of the software industry, and the use of empirical and secondary data. It adopts a qualitative approach. Interviews were carried out with business owners of software firms, scholars and policy experts.
Botelho et al. (2002)	The characteristics and dynamics of the Brazilian software industry in the international context	Empirical	Range of sizes, with a prevalence of larger companies	The study is based on a collection of primary and secondary data, through semi-structured interviews with 55 leading domestic and multinational software firms operating in Brazil. The study is part of a larger international MIT research project on the software industry in India, China and Brazil.
Rocha (1998)	The evolution of software activities in Brazil in the period 1985/1995	Empirical	Industry-level analysis	The analysis is developed through the use of secondary data from The National Household Sample Survey - PNAD database, of the Brazilian Institute of Geography and Statistics (IBGE), and from the Ministry of Science and Technology – MCT.
Ministério da Ciência e Tecnologia – MCT (1993)	The main challenges of the Brazilian software industry for its international competitiveness	Theoretical (Policy-oriented)	Industry-level analysis	The diagnosis of the industry is developed through the use of data available from a variety of secondary sources.

2.3.1 The Institutional and Regulatory Environment

As Botelho et al. (1999) note, there is strong evidence in the literature demonstrating that no country has become an important player in the software industry without some level of governmental support. In line with this argument, Heeks (1999) points out, for instance, that the level and direction of development of the American IT industry, built in the 1940s, 1950s, and 1960s, were significantly influenced by government money. He describes this approach as “the model of government as industry promoter”, in which government acts along a range of fronts: finance; education and training; research and development; intellectual property rights; infrastructure; and procurement.

It is therefore important to examine the evolutionary trajectory of the software industry in Brazil since its beginnings, recognising that at the outset main-frame large foreign manufacturers preceded the rise of the local software industry (Stefanuto, 2004).

Policies in the Brazilian Software Industry

Several studies of the Brazilian software industry (Botelho et al., 1999; Behrens, 2003; Stefanuto, 2004; Botelho et al., 2005; Roselino, 2006a) conclude that the development of the local software industry was strongly influenced by the Brazilian government’s IT Policy. It can be said that, as an overarching trend, Brazilian IT policies shifted from protectionism in the 1970s to liberalisation in the 1990s and can be grouped into two main phases.

The first phase, during the 1970s and early 1980s, while the country was under military dictatorship, was characterised by an IT policy known as “market reserve” with a focus on hardware development. This policy was most important from 1980 to 1984 and its operationalisation was under a government body, the Special Secretary for Informatics (SEI) which reviewed local user firms’ requests to purchase foreign technology. The expectation was that, through the Informatics Law (Law 7232/84), domestic firms would take advantage of incentives to develop their industrial capabilities and generate technological innovations.

In this phase, the government’s strategy aimed basically at fostering the creation of locally-owned companies, controlling direct software imports, and promoting the production and trade of packaged software – a strategy which led to a large, fast-growing industry protected from competition with world industry leaders (Botelho et al., 1999; Behrens, 2003). Although the market-reserve regime was not successful in establishing a truly competitive industry, as Botelho et al. (2005) argue, there were some positive outcomes:

- (1) An increase in the number of professionals in computer science and related disciplines;
- (2) The provision of a nationwide dimension for IT companies;
- (3) The facilitation of the acquisition of technologies by local firms through foreign alliances; and
- (4) The creation of highly sophisticated market niches for local industry in both the banking and telecommunications sectors.

As also noted by Botelho et al. (2005), one of the negative effects of policies in the 1970s and 1980s was a pattern of strong concentration of

Brazilian software companies in southern and southeastern regions of the country (22 and 59 percent respectively). The authors explain this pattern by pointing out that these regions were already the most industrialised and had better R&D infrastructure when they were targeted in early Brazilian informatics policies.

The second phase, from the 1990s and throughout the 2000s, has been a period of increased liberalisation and global competition, characterised by a market-competitiveness policy. The main policy measure to strengthen the Brazilian software sector was a new Informatics Law in 1991 (8248/91), and its subsequent versions in 2001 (Law 10176/01) and 2004 (Law 11077/04), which no longer discriminated against foreign companies but, more importantly, provided local companies with tax incentives for innovation through research and development activities in partnership with universities (Behrens, 2003). During this second phase, while the tax incentives for local manufacturing were maintained, they also benefited foreign players, attracting companies such as Compaq, Acer, IBM and, later, Dell. As a result, larger local IT companies sought commercial partnerships with foreign manufacturers (Behrens, 2003).

After a period of relatively few federal government's policy instruments for the industry during the earlier 2000s, primarily financial incentives, the Brazilian software industry gained a new stimulus with the launch, in 2004, of the Industrial, Technological and Foreign Trade Policy (PITCE), with information technology and software being targeted as one of the sectoral priorities of the new policy (Botelho et al., 2005; Softex, 2009). Authors such as Arbix et al. (2004), Roselino (2006a) and Pereira et al. (2006) regard the

PITCE policy as an advance at the institutional level, and one that marked the emergence of a modern industrial policy, based on knowledge and technological development as well as oriented to foreign trade, which could help promote industry competitiveness. However, Pereira et al. (2006, p. 25) warn that the implementation of the PITCE policy could be jeopardised by strong internal and external obstacles such as the needs to reduce costs and increase State revenues, and restrictions imposed by international agreements and negotiations, respectively.

Finally, the Brazilian Government launched in 2008 the Production Development Policy (PDP), coordinated by the Ministry of Industry, Commerce and Foreign Trade (MDIC). Without differing much from the PITCE Policy, the PDP could be understood as a further expansion of its antecedent, though with a more defined governance structure, concerted efforts between different public agents, and the establishment of measureable strategic goals (DIEESE, 2008). Mostly, the PDP aims to improve the profile of the increased range of Brazilian export products, both in terms of their added value and their innovative nature. Therefore, although still maintaining the increase of exports of information technology (IT) products and services as one of its goals, the PDP extends its support instruments to a much broader range of sectors/chains. Examining the impacts of the PDP would be premature, but it can be noted that while this broadening of sectors, on the one hand, can be regarded as an inclusive measure, given the wide and diversified industrial basis of the Brazilian economy, it may, on the other, impose great challenges for the federal government to coordinate and integrate different programs into a cohesive

policy framework. Table 2.4 illustrates the key policy measures which were developed during the two main phases that conditioned the creation and evolution of the Brazilian software industry.

Table 2.4: Phases of Policy Measures in the Brazilian Software Industry

Phase	Year	Policy Measure	Details
Market Reserve Policy	70s & 80s	Computer hardware Market Reserve Policy	Goal was to have domestic firms to grow and develop autonomous technology in critical market segments, so as to limit the incorporation of foreign technology through the interaction with MNCs present in the Brazilian market. The policy targeted the low-end of the current market, first the minicomputer segment, and next the microcomputer /desktop segment. Foreign competitors were kept out of these segments through import/FDI restrictions.
	1984	Informatics Law (Law 7232/84)	Set orientations and guidelines for Brazil's Informatics Policy.
	1990s	Import and Market Liberalisation	Objectives were to take advantage of the growth rates of international trade, far above the growth of the global economy; and to spur a sustained growth of the Brazilian economy, following a decade of stagnant growth also known as the lost decade
	1991, effective 1993	Law 8248/91	Law gave qualified firms corporate tax rebates and levy exemptions if they manufactured products with a certain level of domestic components, developed local technology, and invested a share of revenues in R&D activities in the IT hardware industry. This law contributed to the establishment of software development capacity and was in effect until 2001, when it was altered.
Market Competitiveness Policy	1992	End of Market Reserve Policy	Substituted by a more market-oriented policy that still sought to preserve the capabilities acquired by domestic firms in the previous period, and also aimed at solving trade-balance deficits by stimulating foreign firms to establish local hardware production. The new policy measures included fiscal incentives for foreign firms and research grants to Brazilian firms.
	1993	Program for the Strategic Development of IT (DESI)	Launched by Ministry of Science and Technology, one main policy thrust was SOFTEX 2000 – National Program for Software Exports, aimed at creating an export-oriented software industry. The program received resources issuing from the fiscal incentives produced by IT laws, in 1994 and in 2002.
	1996	SOFTEX Society was established	The philosophy underlying the SOFTEX Society, a non-governmental organisation, was to stimulate the creation of start-up software firms in various parts of the country through the creation of business incubators in various parts of the country.

Table 2.4: Phases of Policy Measures in the Brazilian Software Industry (continued)

Phase	Year	Policy Measure	Details
Market Competitiveness Policy	2001	Law 10176/01	The law kept the spirit of the previous Law 8248/91, but modified shares of incentives and stipulated that some of the investment had to be done in less favoured regions.
	2004	Law 11077/04	The law alters Law 10176/01 and grants a reduction of up to 100 percent on Industrialised Products Taxes (IPI) for goods developed and produced in Brazil. In return, 5 percent of the revenues obtained from the sales of products under these incentives should be invested in R&D in partnership with R&D institutions.
	2004	PITCE Policy	The Industrial, Technological and Foreign Trade Policy (PITCE) can be characterised as a tool to promote industry competitiveness, and to encourage and finance export. It had chosen software as one of the priorities. It comprises a set of 53 broad measures, among which three consist of tax benefits and four deal with credit mechanisms, gathered in 11 programs. Nine programs are aimed at the IT/software sector, including the Program on Incentives to Free Software Development and the New Prosoft, a program that provides three BNDES (The Brazilian Development Bank) financing lines: corporation, marketing, and export. Under PITCE guidelines, the Innovation Law (10.973/2004) was issued, increasing academic IP rights, encouraging greater university-industry joint R&D ventures, and stimulating industrial R&D by providing tax incentives, subventions and subsidised loans.
	2008	PDP Policy	The Production Development Policy (PDP) was launched by the Ministry of Industry, Commerce and Foreign Trade (MDIC) and represents a further expansion of PITCE. It aims mainly to contribute to sustainable economic expansion with an emphasis on private sector-led export growth of information technology (IT) products and services, to increase industry's capacity to innovate, and to create small and medium companies in strategic areas. With a more defined governance structure, it brings a reduction in payroll costs, including a reduction of half the Social Security taxes for exporting companies. PDP also allows companies to use research investments as a deduction in determining the tax bracket for income and social security taxes.

Sources: Veloso et al. (2003), Pereira et al. (2006), Ministério da Ciência e Tecnologia - MCT (2008), DIEESE (2008) and Softex (2009)

The Softex Program

Launched in 1993 by the Ministry of Science and Technology (MCT), the Brazilian Software Export (Softex) Program has been recognised by several authors (Stefanuto, 2004; Botelho et al., 2005) as one of the most important governmental policy instruments in the 1990s for the development of the Brazilian software industry. With governmental funds of almost R\$69 million committed in the period 1992-2000, the specific mandate of the Softex program was to reach US\$2 billion of Brazilian software exports by 2000, achieving 1 percent share of the global market (Stefanuto, 2004). In later stages of its development, the program had its mandate broadened to include not only exports and entrepreneurship, but overall industry promotion.

According to Stefanuto (2004), the history of the Softex Program basically comprised two phases: (1) the implementation of the program, between 1992 and 1996; and (2) the consolidation of the program, between 1997 and 2000. While during the first phase strong government support assured the operational focus on export promotion, the second phase was characterised by modifications in the program's strategies and operations and a decline in governmental support. In fact, in 1996, the governmental program came to an end and a non-governmental organisation was established to continue running the Softex program, the Softex Society (Behrens, 2003; Kubota, 2006).

Although its results are controversial, mainly because of its overambitious plans for Brazilian software exports, which were not accomplished, Stefanuto (2004) points out that by the year 2000 the Softex

program had achieved four of its five original objectives: approximately 800 software companies assisted against the initial forecast of 100 companies; 19 geographically dispersed and independent nuclei (known as Softex Agents) in contrast to the 6 initially planned; more than 30 foreign-market assessment studies against 30 originally planned; and 6 international commercial offices against 1 international office initially planned.

Among the contributions of the program, several authors (Botelho et al., 1999; 2005; Roselino, 2006a) cite the greater exposure of domestic firms to the requirements of international markets; a significant support structure; the implementation of a wide network of agents; and the introduction of an entrepreneurship and business-plan culture in universities in the area of software. In 2007, the Softex Program was made up of 22 Agents and 1,643 affiliated companies, 98 percent of which were micro, small and medium-sized enterprises; and it promoted US\$ 53 million of software exports through its export promotion projects (Softex, 2007).

The Protection of Software in Brazil

With the consolidation of information technology in the 21st century, intellectual property protection is a crucial element of product and process innovation for almost all industries in the world. According to UNCTAD (2002), lack of an intellectual property rights regime covering software and computer services will hinder the development of a successful industry.

For most developing countries, intellectual property rights will become an issue that has to be addressed if the industry is to fruitfully develop its exports competences. In this context, software piracy can be regarded as a

recurrent worldwide problem for firms and governments, leading to an underestimate of the economic contribution of the software industry which can be very significant depending on the country (OECD, 1998; Carmel, 2003c).

Estimates reveal that approximately 38 percent of new business software was pirated worldwide in 2007, while in the BRIC countries (Brazil, Russia, India, China) the rate was higher – up to 75 percent in the same year, costing the industry almost US\$14.5 billion in lost revenue in these countries, 30 percent of total losses worldwide (BSA, 2007). Heeks (1999, p. 12) asserts that:

“The maturation of a software industry goes hand-in-hand with a legal framework of IP laws and enforcement that only the state can provide. Such a framework is also a sine qua non for serious foreign investment. Microsoft, for example, only agreed to set up a software production facility in Egypt on condition of tougher government legislation against piracy.”

Analysing the challenges of the software industry in Brazil, Botelho et al. (2005) argue that software piracy is particularly damaging to domestic software product development firms because the personal computer (PC) market is dominated by ‘gray-market’ producers who bundle pirated software and aggravate the problem. The authors claim that two factors led to the growth of piracy in the country, particularly in the packaged software segment aimed at small businesses: (1) the informal nature of a large segment of Brazilian economic activity; and (2) the size and fragmented

structure of the domestic market for software. Moreover, weak distribution channels and geographic dispersion make it hard to enforce anti-piracy policies.

Brazil joined the WTO Trade-Related Intellectual Propriety Agreement (TRIPS) in 1996. The protection of software in the country was defined through a specific federal law issued in 1998 (Federal Law no. 9.609) which specifies that software registration is by copyright. The Business Software Alliance (BSA) association in the United States publishes piracy estimates which reveal that Brazil's piracy rate dropped one percentage point to 59 percent from 2006 to 2007, being the second lowest piracy rate in Latin America (BSA, 2007). However, although piracy has been decreasing in Brazil, it still accounts for a large share of the home software market (Botelho et al., 2005).

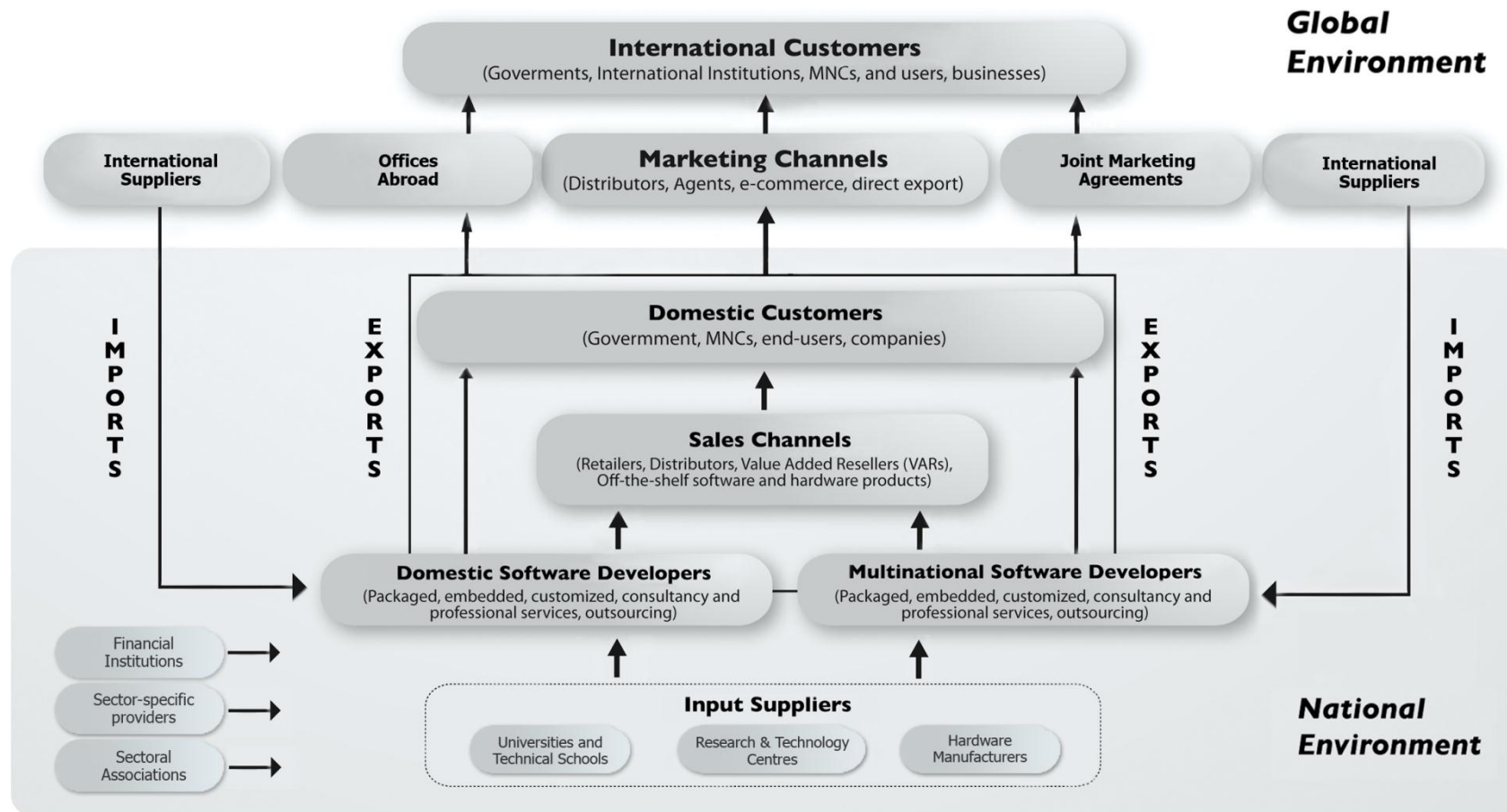
Studies have shown that the strength of social and economic institutions (Marron and Steel, 2000) as well as cultural factors such as individualism, educational expenditure, and religion (Yang and Sonmez, 2007) have a critical impact on intellectual property protection and software piracy. In this direction, as part of a policy-making scheme, the Brazilian government created in 2004, by Decree no. 5244, the National Council on Combating Piracy and Intellectual Property Crimes (CNCP) in which a public-private body, working under the Ministry of Justice, discusses and implements intellectual property enforcement policies that can be grouped into three categories: suppression, educational and awareness-raising measures, and economic. (Ministério da Justiça, 2006). Through this new approach, whose results have been praised by the industry itself, software

piracy has been dealt with in a more effective and systematic way by policymakers in Brazil. In evidence of this, the Brazilian Software Companies Association (ABES), a partner of the Business Software Alliance (BSA), acknowledged the partnership with public bodies which led to the seizure of 1.6 million illegal software programs in 2008, in the area of suppression, and, in regard to educational initiatives, to the implementation of training programs for 2.2 thousand public servants and 1.3 thousand university lecturers and entrepreneurs to combat piracy (IDG Now, 2009).

2.3.2 The Brazilian Software Industry Supply Chain

The structure of the supply chain in the Brazilian software industry is depicted in Figure 2.1. The diagram shows the constituents of the supply chain as well as their interdependent relationships within the chain. The supply chain can be split into five main segments: input suppliers; service providers; software development firms; sales channels; and domestic customers.

Figure 2.1: The Supply Chain in the Brazilian Software Industry



Sources: Stefanuto (2004), Roselino (2006) and Kubota (2006a)

(1) Input suppliers cover universities and technical schools; research & technology centres; and hardware manufacturers. The education segment is responsible for the formation of a skilled workforce in the industry, comprising technical schools, hundreds of undergraduate and graduate computer science courses in all major universities, and a network of laboratories. The segment supplies a large number of IT professionals every year for the growing software industry, arguably as one of the effects of the market reserve policy in Brazil during the 1970s (Magalhães et al., 2009). Research & technology centres encompass activities which are mainly based on government-sponsored programs in Brazil. The centres are oriented towards building infrastructure and promoting joint projects between universities and private firms (Tigre et al, 2001; Roselino, 2006a). Furthermore, private R&D institutes were also created in Brazil during the second half of the 1990s, under the incentives of Law 8248/91 (see Table 2.4), promoting stronger links between the latter, MNCs, and universities. As a consequence, this institutional environment has given rise to R&D investments by MNCs which, on one hand, helped the development of the software industry as a whole in the country, but, on the other, generated few collaborative arrangements with domestic software firms, as Stefanuto (2004) notes. Software firms rely on hardware manufacturers as an important segment of the supply chain. Since its outset, the Brazilian software industry has been intertwined with the hardware industry (Stefanuto, 2004; Botelho et al, 2005; Roselino, 2006a). The hardware segment benefited from

the Law 8248/91 (see Table 2.4) and comprises hardware manufacturers of components, work stations; networks, telecommunication devices; specific hardware, peripherals, and other products. The segment is largely represented by MNCs but there are also a few large domestic manufacturers.

(2) Service providers comprise financial institutions; sector-specific providers; and sectoral associations such as ABES – Associação Brasileira de Empresas de Software, ASSESPRO – Associação das Empresas Brasileiras de Software e Serviços de Informática; and the Softex Society. The Softex Society (see Section 2.3.1) plays an important role in the business education of software professionals and entrepreneurs, as it has built a nationwide support structure with a network of agents, introducing entrepreneurship and business-plan culture in universities, certifying entrepreneurs and promoting national and international businesses in the area of software, mainly small- and medium-sized firms (Botelho et al., 2005).

(3) The Brazilian software industry consists of both domestic and multinational firms. Highly fragmented in its structure, the Brazilian software industry is mainly comprised of micro enterprises (82 percent), followed by small (14 percent), medium (2 percent) and a few large enterprises (2 percent), geographically concentrated in the southern and southeastern regions (22 and 59 percent respectively) of the country (Botelho et al., 2005). Although the software industry is predominantly comprised of domestic firms, MNCs have a dominant presence among the largest software firms. Besides multinationals,

another characteristic of the Brazilian software industry is that government software firms such as SERPRO⁷ are also major players in the country (Botelho et al., 2005). There are no unified official statistics available to date for the number of Brazilian software development firms. However, two empirical studies suggest that the population of such firms is considerably smaller than the overall population of IT companies⁸. Stefanuto's (2004) study claimed 2,398 software development firms, while Roselino's (2006a) work, using the CNAE⁹ classification, found 1,592.

(4) Sales Channels encompasses retailers; distributors; value added resellers¹⁰ (VARs); off-the-shelf software and hardware products which are mainly used for commercialisation of packaged software products to both end-users and companies. Other types of software such as embedded; customised; consultancy and professional services; as well as outsourcing, are directly marketed to businesses users.

(5) Domestic Customers: the Federal government is the leading single user of software products and services in Brazil, followed by the banking and the telecom sectors (Stefanuto, 2004). The telecom sector plays a critical role in the whole supply chain of the software

⁷SERPRO is the Brazilian federal government's IT services provider, managed by the finance ministry (www.serpro.gov.br).

⁸The growth of the industry in the 1990s was marked by an increase both in the number of software companies and in the number of employees: in the period 1994-2001, from 7,000 to 10,700, and from 112,000 to 167,000, respectively (Botelho et al., 2005). A more recent study by Roselino (2006a) shows similar figures for the industry as of 2002, indicating 10,457 existing companies covering the whole range of activities in Brazilian IT, with 188,233 employees.

⁹ The National Classification of Economic Activities (CNAE) of the Brazilian Institute of Geography and Statistics (IBGE) is the standard industrial classification used throughout the Brazilian Statistical System for the variety of statistics and surveys requiring industrial activity classification such as enterprise surveys, household surveys, employment surveys and the System of National Accounts, as well as in administrative registers and files. The CNAE classification has as standard The International Standard Industrial Classification of All Economic Activities – ISIC, developed by the Division of Statistics of the United Nations for classifying economic data.

¹⁰ Value Added Resellers (VARs) designates sales agents of a product that simultaneously add value to a product.

industry. Due to large scale privatisation and pro-competitive regulation in the late 1990s, Brazil is regarded as Latin America's largest telecom market, with 53 million fixed subscribers, 150 million mobile subscribers and 53.9 million Internet customers in the year of 2008 (Reuters, 2009). With the supply of a variety of services such as access provision, site hosting, commercial Internet backbone networks, fixed and mobile telephone systems, the telecommunications segment is at a relatively high level in the country. If, on the one hand, the telecom sector provides the necessary infrastructure for the operational activities of software firms, on the other is one of the largest markets for the industry in Brazil, with MNCs playing a leading role in the domestic market. For example, software is estimated to represent 50 percent of product cost in most hardware telecom products (Botelho et al., 2005). As a sophisticated client, the telecom sector plays an important role in the development of embedded software, games for mobile phones, and other software applications for hardware telecom products by innovative local firms (Botelho et al, 2005). The Brazilian government also plays an important role in facilitating access to basic telecommunication services to the population as well as to businesses, improving trust in usage of Brazil's info-communication, as 72 percent of all federal services are provided online (ITU, 2002).

2.3.3 The Dynamics of the Brazilian Software Industry

As mentioned earlier, Brazil has become the seventh largest software market in the world and the Brazilian software industry has been the most important IT sector in the country since the 1990s. Software represents 42 percent of the total IT market in Brazil (Botelho et al., 2005, p. 106). However, while in small developed countries and emerging economies such as Finland, India, Israel, New Zealand and Singapore, the IT industry's success was based on exports-led growth, in marked contrast the growth of the industry in Brazil has relied almost exclusively on domestic IT use (Behrens, 2003; Ein Dor et al., 2004; Stefanuto, 2004; Botelho et al., 2005; Roselino, 2006a).

Level of Competitiveness

A comparison of competitiveness statistics by Botelho et al. (2005) for Brazilian industry overall and, in particular, for the software sector, demonstrates the faster pace of the latter sector in regard to sales and job creation. For example, in the period of 1995-2000 the sales growth of the software industry was 24 percent in contrast to 2 percent for industry as a whole, while in the period 1994-2000 a growth of 7 percent in the number of workers was achieved, in comparison to a negative growth of 1 percent for industry as a whole. Further, Brazil is the largest packaged software market in Latin America, accounting for over a third of the total software market in the Region. Another factor that might contribute to the overall level of competitiveness of the Brazilian software industry is the existence of some sectors that are sophisticated and strong customers for software systems,

such as the telecommunication and banking sectors, that can spur the development of capabilities. In this context, linkages between local and foreign firms may facilitate knowledge transfer processes and spin-offs in the industry.

Finally, a study by The Economist Intelligence Unit (2008), sponsored by the Business Software Alliance (BSA), ranks the information technology (IT) industry environments of 66 countries by the extent to which they support the competitiveness of IT firms. The study points to six drivers that are essential to creating a supportive environment for the competitiveness of the IT sector: (1) overall business environments; (2) IT infrastructure; (3) human capital; (4) legal environment; (5) R&D environment; and (6) support for IT industry development. Besides the unchanged position of the top twenty countries (US, Taiwan, UK, Sweden, Denmark, Canada, Australia, South Korea, Singapore, Netherlands, Switzerland, Japan, Finland, Norway, Ireland, Israel, New Zealand, Austria, Germany, and France), the study highlights that IT industry environments in Europe and Asia as well as in emerging markets are becoming more competitive. According to the study's methodology, Brazil occupies the 43rd place in the 2008 ranking, whereas other emerging economies such as India, Russia and China score 48th, 49th, and 50th respectively.

Human Capital

The growth in the number of students graduating with IT degrees was substantial in Brazil in the '90s – threefold in the period 1991-1999 – for which Behrens (2003) acknowledges the role and efforts of government

policies. Moreover, Botelho et al. (2005, p. 110) indicate that in 2000 Brazil graduated close to 18,000 people in IT areas. As a result, when population size is considered, Brazil graduates 101 persons per million inhabitants, while India has a figure of 32 and China 69 per million. Also, over 5,000 master's degrees in IT-related areas were awarded between 1996 and 2001. However, Behrens (2003) expresses concerns for the current supply of graduate-level courses in Brazil, which are concentrated mainly in the Southeast, the economically more advanced region of the country. Further, Roselino (2006a) stresses that the effectiveness of national education policies and investments aimed at contributing to an adequate supply of skilled professionals for the Brazilian software industry, expressed for example in the number of software engineering graduates, will be dependent on strategic choices.

Differences between Domestic and Foreign Firms

Because of their local-market orientation, multinationals operating in Brazil compete with domestic smaller software firms for the vast domestic IT market. Classifying software activities into a typology of three categories (low-value services; high-value services; and packaged software), Roselino (2006a) shows that although domestic firms are in the majority in the software industry in Brazil, there are significant disparities between domestic and foreign firms in a number of key indicators, as can be seen in Table 2.5.

Table 2.5: Software Firms in Brazil: Average Values in R\$ (2002)

	Brazilian Private Software Firms n=657			Foreign Software Firms n=76		
	Low-Value Added Services	High-value Added Services	Packaged Software	Low-value Added Services	High-value Added Services	Packaged Software
Net Average Revenues	10, 328,643	6,914,922	6,002,344	37, 473,197	86, 515,693	40, 037,532
Average No. of Employees	163	67	56	173	259	96
Per Capita Net Revenues	63,263	102,584	108,092	216,365	334,272	414,971

Source: Roselino (2006a)

Looking at Table 2.5, three aspects can be highlighted. First, the net average revenues figures are significantly higher for foreign firms across the three categories of software. Second, the average number of people employed in foreign firms is also higher than in Brazilian firms showing that the larger foreign firms are concentrated in marketing high-value added services, while domestic firms are of lower value added, corroborating Arora and Gambardella (2004). Third, productivity is higher in foreign firms, particularly for packaged software, as the figures for per capita net revenues show.

Internationalisation of Brazilian Software Firms

Despite efforts made by private and public actors to promote exports and the international competitiveness of the Brazilian software industry, its level of internationalisation remains low in contrast to the growth of software exports from other emerging countries such as India.

While official statistics about software exports in the Brazilian industry are still lacking, a study by Roselino (2006a) indicates that US\$ 81.6 million of export revenues were achieved by software firms operating in Brazil in 2002, 95 percent of this by foreign firms. A study by Softex (2005) on 30

software exporting firms in Brazil also reveals significant differences between foreign and domestic firms: e.g. 79 percent of exports reported were by foreign firms in the survey; and all foreign firms had clear export strategies, while this was the case for only 81 percent of domestic firms.

Several authors (Botelho et al., 2002; Behrens, 2003; Stefanuto, 2004; Botelho et al., 2005; Roselino, 2006a) have pointed to factors that might influence the relatively low exporting performance of Brazilian software firms:

- (1) Macroeconomic factors;
- (2) The long-lived market reserve policy;
- (3) Lack of specific policies;
- (4) The existence of a huge domestic market;
- (5) Lack of adequate funding to the industry;
- (6) Lack of an exporting culture;
- (7) Weak collaborative linkages between Brazilian software SMEs;
- (8) Limited management and marketing skills among technologists;
- (9) Entrepreneurs' lack of familiarity with foreign business circles;
- (10) Lack of image for Brazilian software internationally;
- (11) Lack of language skills among IT professionals; and
- (12) Lack of access to finance.

In Table 2.6, the key characteristics of the Brazilian software industry discussed in this section can be seen.

Table 2.6: Key Characteristics of the Brazilian Software Industry

General Characteristics	
<ul style="list-style-type: none"> • Strong and large domestic market • Inward orientation, domestic-market focused • Low level of inter-firm collaboration • 42 percent of the total IT market in Brazil • 1,592 companies, of which 98 percent micro, small and medium-sized enterprises • Geographical concentration of firms in the Southeast (59 percent) and South (22 percent) Regions • 188,233 employees • Annual average growth rate of 13 percent (1991-2001) • 24 percent sales growth (1995-2000) • US\$ 81.6 million of exports in 2002 	
Domestic Firms	Foreign Firms
<ul style="list-style-type: none"> • Mainly SMEs • Higher net average revenues in low-value services • 5 percent of Brazilian exports • 75 percent of exports in software, 25 percent in services • 72 percent of employment • 81 percent define clear export strategies 	<ul style="list-style-type: none"> • Large firms • Higher net average revenues in high-value services • 95 percent of Brazilian exports • 83 percent of exports in software, 17 percent in services • 28 percent of employment • 100 percent define clear export strategies

Sources: *Botelho et al. (2002), Stefanuto (2004), Botelho et al. (2005), Softex (2005), Roselino (2006a)*

Software Exports and Imports in the Brazilian Software Industry

Notwithstanding the low performance of direct exports by Brazilian software firms, software constitutes, due to its cross-sectoral character, an increasingly important link in many distinct internationalised industry chains in Brazil. Cases of Brazilian software firms participating in such internationalised industry chains can be found in microelectronics and telecommunications, as a study by Roselino (2006a) reveals. Some studies have shown that exports in the Brazilian software industry mainly constitute vertical software products and services, particularly in highly specialised niches, such as banking and telecommunications systems (MIT, 2002; Behrens, 2003; Stefanuto, 2004; Softex, 2005; Botelho et al.; 2005). Typical exported products of Brazilian software firms include MIS applications packages (e.g. transactional banking systems, integrated management systems, and statistical analysis), software utilities (anti-virus software, software distribution systems, text retrieval tools), and applications.

Embedded software in hardware and telecom equipments, in particular, comprises another category of product that has been growing recently in Brazilian software exports, through the international channels of Brazilian subsidiaries of MNCs such as Siemens, Lucent, and Ericsson (Stefanuto, 2004; Botelho et al.; 2005). Embedded software is not sold separately from the product/equipment into which is integrated. Also, in the area of export services, some Brazilian firms entered the international outsourcing market through specialised vertical banking offshore projects (Botelho et al.; 2005).

For example, in terms of R&D activities by MNCs in Brazil, Gomes (2003) points out that in the state of São Paulo, the Brazilian subsidiary of Nortel Network Corporation, a multinational telecommunications equipment manufacturer, has a global mandate for the development and supply of a Time Division Multiple Access (TDMA)-based platform for cellular/in-building wireless software for mobile telecom providers. In this context, local suppliers of telecommunication equipments are concentrating R&D efforts in the development of embedded software which is indirectly exported through the MNCs wireless software.

In regard to imports, firms in the Brazilian software industry have gained increased access to new technologies for their operations mainly through software licensing acquisition, while the more competitive firms also add value to the imported technology (Stefanuto, 2004). The author, citing data of Brazil's Central Bank, highlights that imports of software have grown 15 times in the period of 1993 to 2000.

Finally, exploring the distinct paths adopted by Brazilian software firms to enter international markets, recent studies by Dib (2008) and Dib et al. (2008) have investigated the choice of an early internationalisation path in a sample of 79 Brazilian software firms. They found that born-global firms ¹¹ had a higher intensity of internationalisation, measured by international activities as a percentage of income, than traditionally-internationalised ¹² firms. Yet, when comparing early and late internationalised firms, the authors argue that due to environmental constraints such as the opening of the Brazilian economy in the 1990s, no significant distinctive characteristics could be identified as between the two groups.

2.4 Concluding Remarks

This chapter has reviewed the main features of the Brazilian software industry. The software industry represents 42 percent of the total IT market in Brazil, being the Latin American country with the largest packaged software market in the Region, and the seventh largest in the world. Also, the software sector, in comparison to overall industry in Brazil, presents better performance in regard to sales growth and job creation in the period of 1995-2000.

Examination of the evolutionary trajectory of the Brazilian software industry, discussed in this chapter, shows that specific laws, regulations, and targeted incentives under Brazil's IT policy have shaped the structure of the industry as well the many segments in the supply chain. The Brazilian

¹¹ The term born-global firm is used to designate a firm that follows an early and accelerated process of internationalization, defined as the first revenues obtained from international operations up to five years from inception (Dib et al, 2008).

¹²Traditionally-internationalised firms follow the traditional pattern predicted by behavioural models of internationalization such as the Uppsala Process Model (Dib et al, 2008).

software industry is predominantly focused on the domestic market, with foreign firms operating in the country accounting for 95 percent of export revenues in 2002.

The path followed by new exporting nations such as India, Ireland, and Israel, which have experienced remarkable export growth, vis-à-vis the trajectory of the domestic industry, seems to indicate that there is no panacea for the national software industry to achieve sustained international success. Rather, a complex mix of factors, including skilled and educated labour, international linkages, and a supportive institutional structure, will contribute to the development of an internationally competitive software industry in Brazil.

In face of the increasingly globalised nature and highly competitive character of the software market, there remain important challenges for Brazilian software firms in becoming internationally competitive. Most of the studies focused on in this review, however, do not fully address the integration of macro-level as well as micro-level factors to obtain a more comprehensive view of the constraints and opportunities for Brazilian software firms in the international context. Hence there is a strong case for further research on the determinant factors, either internal or external to the firm, affecting the international behaviour of software firms from emerging economies. In the next chapter, a comprehensive review of internationalisation theories helps to identify the likely determinants of exports and imports by firms, leading to the adoption of an integrative framework and a set of testable hypotheses.

Chapter 3: Literature Review, Conceptual Framework and Hypotheses

3.1 Introduction

Even though scholars of various schools of thought have called for integration of the various theoretical strands in internationalisation research (Bell and Young, 1998; Coviello and McAuley, 1999; Andersson, 2000; Jones and Coviello, 2005; Rialp et al., 2005; Aspelund et al., 2007), no such integrated model has yet been fully developed.

Acknowledging this gap, the present chapter identifies a number of relevant variables through the “lenses” of established fields of research and synthesizes them into an integrative conceptual framework in order to examine key determinants of the internationalisation of Brazilian software firms. This framework is used to generate a number of hypotheses which are tested in the latter part of the thesis. Four distinct groups of determinants are investigated, both external and internal to the firm, each of which comprises a theoretical dimension¹³ of the research framework.

The chapter starts with a definition of internationalisation in Section 3.2, followed by a review of key major schools of internationalisation research in Section 3.3. An assessment is made of both purely economics-based and behavioural schools of internationalisation, with a stress on the

¹³Used in the sense of “aspects, attributes or elements making up an entity, phenomenon or construct” (based on Oxford English Dictionary and BusinessDictionary.com).

latter. The review of the literature leads to identification of relevant determinants of internationalisation, which are detailed in Section 3.4. Section 3.4 also provides an examination of each of the theoretical dimensions in the integrative framework, as well as a summary of the research hypotheses. The chapter concludes with a summary in Section 3.5.

3.2 Definition of Internationalisation

Inward-outward internationalisation patterns have received some attention in recent years. Examining the empirical literature, however, it can be noted that the vast majority of studies concentrate on the outward component of the internationalisation process, leaving aside other aspects of international operations - such as imports (Tucci, 2005; Muûls and Pisu, 2009). Moreover, the concept of internationalisation itself is clearly more associated with its outward direction.

By investigating the directionality of internationalisation, some researchers have put forward the notion of internationalisation as a two-sided process of both inward and outward international operations (Welch and Luostarinen, 1994; Korhonen et al., 1996; Fletcher, 2001; Karlsen et al., 2003). Furthermore, a study by Jones (2001) found a preponderance of inward cross-border activity as a fundamental part of the first steps in the internationalisation process of small high-technology firms. The author argues that “internationalisation in today’s context is less about entering foreign markets than it is about increasing the firm’s exposure and response to international business influences, opportunities, threats, and imperatives” (p.193). Consequently, following several authors who offer a holistic

interpretation of the internationalisation concept (Beamish, 1990; Calof and Beamish, 1995; Korhonen et al., 1996; Fletcher, 1996; Karlsen et al., 2003) in this study the term internationalisation will be used to refer to both the inward and outward international operations by firms. Although the review in Section 3.3. encompasses studies of internationalisation concentrating on a variety of modalities such as FDI, subsidiaries in foreign markets, and international joint-ventures, a particular focus on trade-related activities, i.e., importing and exporting, is given in this study because, based on both theoretical and empirical grounds, these are the modes of international activity most frequently reported by high-technology firms in both developed and emerging economies (Bell, 1995; Jones, 2001; Arora and Gambardella, 2004). Thus, internationalisation within this thesis will be defined as *“international engagement through (a) exports and (b) imports.”*

3.3 Review of Internationalisation Research

The topic of internationalisation has given rise to a vast body of studies from a variety of theoretical perspectives. To bring all this together, an assessment of the literature-review work on internationalisation research by several authors (Coviello and McAuley, 1999; Fillis, 2001; Zhao et al., 2004; Blonigen, 2005; Rialp et al., 2005; Zahra, 2005; Ruzzier et al., 2006; Aspelund et al., 2007; Slangen and Hennart, 2007) was done. Also, the literature on the exporting mode of a firm's internationalisation process was examined, based on the findings of literature reviews done by Leonidou and Katsikeas (1996) and Zou and Stan (1998).

A summary of these selected reviews of internationalisation research can be seen in Table 3.1. For the purpose of this study, after the assessment of the mainstream schools of internationalisation research, a taxonomy is suggested that classifies contemporary internationalisation studies into two broad streams of research. The first is the economics perspective, with a substantial bulk of research focusing on analysis of internationalisation based on rational economic considerations. Since this thesis takes a behavioural approach to the investigation of Brazilian software firms' internationalisation, only a brief selection of the main contributions within the economics school is provided. The second stream, in which this study is placed, encompasses studies using behavioural perspectives, in an attempt to examine determinant factors related to firms' internationalisation processes.

Table 3.1: An Assessment of Internationalisation Research: Selected Reviews

Author (Year)	Focus of Study	Theoretical Approach Examined	Number of studies (time span)	Industry Type and Firm Size	Level of Analysis	Key explanatory Variables	Conclusions and Recommendations
Leonidou and Katsikeas (1996)	Exports	Export development models	11 empirical studies (1975-1995)	Manufacturing SMEs	Firm-level	<ul style="list-style-type: none"> ▪ Psychic distance ▪ Resource commitment ▪ Decision-maker's characteristics ▪ Foreign business attitudes ▪ Objective and experiential knowledge ▪ Organisational determinants: size, product uniqueness, technology intensiveness, resources ▪ Export stimuli ▪ Factors as stimuli or barriers ▪ Forces facilitating or inhibiting exports 	<ul style="list-style-type: none"> ▪ Export development as an evolutionary and sequential process ▪ Criticisms: single-activity orientation of studies (export operations); too eclectic and mechanistic; export expansion from the standpoint of developed countries; neglect of foreign buyers and customers
Zou and Stan (1998)	Exports	Determinants of export performance	50 empirical studies (1987-1997)	Large firms and SMEs from a range of manufacturing sectors	Firm-level	<p>External factors</p> <ul style="list-style-type: none"> ▪ External environment; industry characteristics; national export policy; domestic market pressure <p>Internal factors</p> <ul style="list-style-type: none"> ▪ Internal organisational resources; export strategies; export planning; managers' attitudes, perceptions, and characteristics; firm characteristics and competencies. 	<ul style="list-style-type: none"> ▪ Need for consistent conceptualisation and measurement of export performance ▪ Lack of agreement on the relevant determinants ▪ Need for cross-cultural studies

Continued

Table 3.1: An Assessment of Internationalisation Research: Selected Reviews (continued)

Author (Year)	Focus of Study	Theoretical Approach Examined	Number of studies (time span)	Industry Type and Firm Size	Level of Analysis	Key explanatory Variables	Conclusions and Recommendations
Coviello and McAuley (1999)	Internationalisation	Internationalisation of SMEs	16 empirical studies (1989-1998) Classified into 3 schools: FDI, Stages, and Network	Large firms and SMEs from a range of sectors	Firm-level	FDI school: <ul style="list-style-type: none"> FDI as a rational managerial decision-making process Stages school: <ul style="list-style-type: none"> Incremental commitment Psychic distance Inward-outward patterns Network school: <ul style="list-style-type: none"> Collaboration between firms Mutual learning Innovation Client followership Network contacts Unplanned use of contacts and connections Technology 	<ul style="list-style-type: none"> Literature tends to rely on the large multinational firm The three schools of research approach the internationalisation concept from different theoretical bases Integrated theoretical approaches are beneficial to understanding SME internationalisation
Fillis (2001)	Internationalisation	Smaller firms' Internationalisation	34 studies (1975-2000) Conceptual, literature reviews and empirical	Large firms and SMEs	Firm-level	<ul style="list-style-type: none"> Knowledge Commitment Network relationships Entrepreneurial competences Competency-based issues Product and industry type Specified resources Relationship building 	<ul style="list-style-type: none"> SME behaviour is mostly described using process/stage theory Existing paradigms have failed to explain adequately small firm internationalisation behaviour Application of the entrepreneurship/marketing paradigm will enhance understanding of SME internationalisation

Continued

Table 3.1: An Assessment of Internationalisation Research: Selected Reviews (continued)

Author (Year)	Focus of Study	Theoretical Approach Examined	Number of studies (time span)	Industry Type and Firm Size	Level of Analysis	Key explanatory Variables	Conclusions and Recommendations
Zhao et al. (2004)	Foreign Direct Investment	Transaction-cost economics (TCE); determinants of ownership-based entry (OBE) modes	38 empirical studies (1985-2002)	MNEs of manufacturing and services sectors	Firm-level	<ul style="list-style-type: none"> Country risk International experience Cultural distance Uncertainty Asset specificity Resource allocation Knowledge 	<ul style="list-style-type: none"> Existing literature establishes an overall significant relationship between TCE variables and OBE Current studies are fragmented and large-firms biased Moderating effects of study-setting variables (location, country of origin, and industry type) raise concerns about generalizability of determinants across national settings Contextual variables may intervene with the power of TCE factors Integration of the TCE dominant paradigm with other theories (RBV, knowledge-based view, and OLI views) brings a new dimension of the efficiency explanation
Rialp et al. (2005)	Internationalisation	Early internationalisation	38 studies, (1993-2003) Either theoretical or empirical	High-tech small businesses, and some manufacturing and services sectors	Firm-level	<ul style="list-style-type: none"> Managerial global vision from inception High degree of previous international experience Management commitment Use of personal and business networks (networking) Market knowledge and market commitment Unique intangible assets based on knowledge management High value creation through product differentiation, leading-edge technology products, technological innovativeness, and quality leadership Niche-focused, proactive international strategy in geographically-spread markets Narrowly defined customer groups with stronger customer orientation and close customer relationships Flexibility to adapt to rapidly changing external conditions. 	<ul style="list-style-type: none"> IB expansion theories (stage/process models) seem to be largely inconsistent with the early internationalisation phenomenon Little research has been devoted to the relationship between organisational behaviour and entry strategies in early international firms Criticism of overemphasis on high-tech sectors or specific geographic areas. Less developed countries' contexts should be investigated More integrated frameworks emerging from different disciplines should support theoretical and empirical work.

Continued

Table 3.1: An Assessment of Internationalisation Research: Selected Reviews (continued)

Author (Year)	Focus of Study	Theoretical Approach Examined	Number of studies (time span)	Industry Type and Firm Size	Level of Analysis	Key explanatory Variables	Conclusions and Recommendations
Zahra (2005)	Internationalisation	Oviatt and McDougall's (1994) Framework of International New Ventures (INVs)	Empirical and theoretical studies No. of studies (not specified) Time span (not specified)	Not specified	Firm-level	<ul style="list-style-type: none"> Internal processes might be the foundation of competitive advantages Founders' cognitions to quickly spot opportunities in international markets Firms' entrepreneurial qualities and characteristics: innovativeness, proactiveness, and risk-taking Unique intangible assets Managerial perceptions of entrepreneurs International entrepreneurial culture: market orientation; learning orientation; innovation propensity; risk attitudes; networking orientation; motivation orientation 	<ul style="list-style-type: none"> Internationalisation is not a one-shot deal Research has overlooked the role of the institutional environment and economic geography in sustaining the ability of INVs to retain competitive advantages Building relationships and gaining access to existing networks can help to shorten INV's learning Future work needed to examine how and when INVs learn
Blonigen (2005)	Foreign Direct Investment	Foreign Direct Investment (FDI) decisions of MNEs	Empirical studies No. of studies (not specified) Time span (not specified)	MNEs	<ul style="list-style-type: none"> Country-level Firm-level, Industry-level 	<p>Internal factors:</p> <ul style="list-style-type: none"> R&D intensity and advertising intensity as proxies for intangible assets Uncertainty and expectations about future exchange rate movements <p>External factors:</p> <ul style="list-style-type: none"> Exogenous macroeconomic factors such as taxes and exchange rates Trade flows Policy factors: quality of political, legal, and economic institutions Skill differences 	<ul style="list-style-type: none"> The literature on the FDI determinants is substantial The literature has derived interesting firm-level models of how exchange rate uncertainty can affect FDI flows Criticism: firm-level studies have used industry-level measures Horizontal and vertical relationships between firms have the power to affect FDI decisions: cheaper funding, and information exchange Need to encompass both short- and long-run factors Factors that determine FDI into developed countries are much different than into less-developed countries

Continued

Table 3.1: An Assessment of Internationalisation Research: Selected Reviews (continued)

Author (Year)	Focus of Study	Theoretical Approach Examined	Number of studies (time span)	Industry Type and Firm Size	Level of Analysis	Key explanatory Variables	Conclusions and Recommendations
Ruzzier et al. (2006)	Internationalisation	Theories of internationalisation of MNEs and SMEs	Empirical and theoretical studies No. of studies (not specified) Time span (not specified)	MNEs and SMEs	▪ Firm-level	Internationalisation theories focusing on MNEs: <ul style="list-style-type: none"> ▪ Market internalisation ▪ Information gathering for decision-making ▪ Costs of transactions ▪ OLI: ownership advantages, internalisation advantages, location advantages ▪ Monopolistic advantages: superior abilities, brand names, differentiated products, patented technology, talented people, superior knowledge ▪ International involvement ▪ Learning ▪ Resource commitment: degree and amount Internationalisation theories focusing on SMEs: <ul style="list-style-type: none"> ▪ International involvement ▪ Gradual learning ▪ Resource commitment: degree and amount ▪ Psychic distance ▪ Top managers ▪ Establishment of network relationships ▪ Development of market knowledge through network relationships ▪ Trust, control, resources, and interdependencies within and between networked firms ▪ Intangible knowledge-based resources ▪ Modes of resource adjustment ▪ Market knowledge ▪ Entrepreneurial knowledge, skills, relationships, experience, ability to coordinate resources ▪ Entrepreneurial actions ▪ Innovation adoption ▪ Entrepreneur personal factors and characteristics: skills, competencies, management know-how 	<ul style="list-style-type: none"> ▪ SME internationalisation research will remain one of the most important areas ▪ Identifies four internationalisation theories focusing on MNEs: internalisation; TCA approach; eclectic paradigm; monopolistic and advantage theory. ▪ Identifies five internationalisation theories focusing on SMEs: Uppsala model; innovation-related models; network approaches; resource-based approach; international entrepreneurship ▪ The firm perspective provides the bulk of specified literature on SMEs' internationalisation ▪ The market perspective has been restricted to diversification strategies of MNEs ▪ Proposes a redeveloped theoretical integrative conceptual model of international entrepreneurship
Slangen and Hennart (2007)	Foreign Direct Investment	Foreign establishment modes	15 empirical studies (1980-2004)	MNEs	<ul style="list-style-type: none"> ▪ Country-level ▪ Firm-level, ▪ Industry-level 	<ul style="list-style-type: none"> ▪ Types of resources ▪ types and complementarities of capabilities ▪ cultural distance ▪ Types of knowledge ▪ Knowledge transfer ▪ Product diversity 	<ul style="list-style-type: none"> ▪ Most often-used perspectives transaction cost/internalisation theory ▪ Different perspectives complement each other ▪ Inconsistent empirical findings due to moderating effects not considered, and research design problems

Continued

Table 3.1: An Assessment of Internationalisation Research: Selected Reviews (continued)

Author (Year)	Focus of Study	Theoretical Approach Examined	Number of studies (time span)	Industry Type and Firm Size	Level of Analysis	Key explanatory Variables	Conclusions and Recommendations
Aspelund et al. (2007)	Internationalisation	International new ventures (INVs)	41 empirical and theoretical studies (1992-2004)	INVs in high-technology services and manufacturing sectors	Firm-level	<p>Three groups of factors:</p> <ul style="list-style-type: none"> ▪ Processes around foundation network building; experiential knowledge from previous international activities of the individual entrepreneur, composition and international experience of the entrepreneurial team as a group, background and knowledge of the entrepreneur, ▪ Organisational issues Niche strategy; psychic distance; personal networks; attention on networks and partners; combination of international intensity and global diversity; international managerial and entrepreneurial orientation; international vision; organisational capabilities; ▪ Environment Industry factors: some sectors are more international than others, technology intensive industries; domestic market conditions: insufficient market size, and domestic competition 	<ul style="list-style-type: none"> ▪ Phenomenon largely reported in high-tech industries but also appears in a wide range of industries ▪ Issue of rapid but still incremental process appears inconclusive ▪ Experiential knowledge does not seem to be key explanatory variable ▪ Psychic distance concept must be used with great caution because other factors in market selection process ▪ Rapid internationalisation is not a sufficient strategy and must be supported by other strategies ▪ INVs use low commitment modes (exporting and licensing) ▪ Specially accommodated entry modes often in interaction with large multinationals, industrial networks ▪ Heterogeneity of international market strategies due to founding processes, organisational factors, and environmental conditions ▪ Limited attention to environmental factors ▪ Proposes a holistic view of the internationalisation of the firm where external factors are put on par with internal and organisational factors

3.3.1 Streams of Research following Economics Perspectives

Arguing that firms crossing international borders are motivated by rational economic considerations, the economics school¹⁴ has greatly influenced international business research. The economics school has developed from neoclassical and industrial trade theories. It explains internationalisation as a pattern of investment in foreign markets made by rational economic analysis.

Based on economic analysis, the focus is concentrated on location and control decisions of internationalising firms (Morgan and Katsikeas, 1997; Buckley and Hashai, 2005). Several theoretical developments have led to a number of theories and models explaining a firm's internationalisation choices and strategies.

Amongst the economics theories, a dominant view comes from the established theory of internalisation (Buckley and Casson, 1976) which asserts that multinational firms gain economic benefits from the internalisation of proprietary asset-exchange across international frontiers. It approaches internationalisation as a pattern of internalisation of markets and investment, either by exporting or foreign direct investment (FDI). Internalisation may involve forms of vertical integration under the ownership and governance of the firm. Within this approach, management gathers information through which it decides the best foreign expansion choice.

Responding to the importance of uncertainty in foreign direct investment decisions, transaction costs economics – TCE (Williamson, 1975;

¹⁴Of course, many of the “behavioural theories” incorporate economic underpinnings; the main differences usually derive from the relative emphasis given to “purely economic” variables such as relative factor prices, as opposed to “behavioural” variables such as managerial discretion. Ultimately, there is no unbridgeable dividing line between the two sets of perspectives.

1991; Anderson and Gatignon, 1986) and the eclectic paradigm, also known as the Ownership-Location-Internalisation (OLI) paradigm (Dunning, 1988, 1993) suggest that the choice of market-entry should incorporate the dimensions of uncertainty and transaction-specific assets.

More recently, models of foreign direct investment decisions of multinational enterprises (MNEs) were enriched by the theory of real options proposed by Buckley and Casson (1998) in which uncertainty is central to the timing of international entry decisions, which in turn are driven by the trade-off between a waiting option and the growth option of an investment (Fisch, 2008). In an attempt to address some dynamic weaknesses of the internalisation concept, the conventional home-host country analysis was expanded by incorporating the choice of exporting, joint venturing and establishing a fully-owned subsidiary into a two-phase decision-tree model (Buckley et al., 2002).

Interestingly, a study by Fisch (2008) points out that congruence between the incremental establishment chain of the Uppsala model and the real-options view might exist. The author establishes a parallel between the timing and dimensioning of investments at market entry in the real-options theory and the Uppsala incremental model, which describes the internationalisation process through sequential steps starting from occasional exports, developing through joint venturing, and culminating with the establishment of a fully-owned subsidiary. Fisch concludes that “the combination of internationalisation and real-options theory may contribute to explaining the evolution of individual subsidiaries, international networks of firms, and multinational corporations” (p.121).

Examining the key findings of three survey papers by Zhao et al. (2004), Blonigen (2005), Ruzzier et al. (2006), and Slangen and Hennart (2007) of research based on economics approaches, shown in Table 3.1, four major characteristics are worth noting. First, theoretical and empirical research following economics perspectives have been large-firms biased. Second, studies following economics perspectives have increasingly explored the role of cultural distance, knowledge (of several kinds) and resources as key explanatory variables at the firm-level of analysis. Third, there has been also considerable attention to environmental factors such as macroeconomic and policy-related factors, incorporating industry-level and country-level analysis. Lastly, there has been some recognition that different approaches within the economics perspective complement each other, such as transaction-cost and internalisation theories, and that potential benefits exist through theoretical integration to explain entry-mode decisions (Zhao et al., 2004).

In summary, this brief review indicates that the literature focussed on economic analysis has developed a large body of scholarly contributions that, using economic theory, provide useful analytical tools to understand market arrangements for international trade and investments. However, as emphasised by Morgan and Katsikeas (1997) much of this research has adopted the large multinational enterprise (MNE) at high levels of internationalisation as the unit of analysis. Perhaps this is due to the fact that previous research has shown that SMEs frequently lack resources for major investments abroad by means of an FDI, since they require greater levels of resource commitment (Lu and Beamish, 2001).

Although admitting that many concepts of the economic theory of multinational enterprises are relevant to the international expansion of smaller enterprises, in his analysis of first-time UK foreign investments by SMEs Buckley (1993) realizes that the analysis of small firms' foreign investment behaviour raises conceptual and strategic issues that need to be considered. He asserts that there are several key areas in which SMEs are different from larger enterprises in their foreign investment behaviour: (1) shortages of capital and management time; (2) shortage of skilled management; (3) higher degree of risks in going international; (4) short horizon in financial strategies; and (5) higher vulnerability to technological, political, institutional, and market changes.

3.3.2 Streams of Research following Behavioural Perspectives

The models and frameworks developed in the last three decades beginning from behavioural perspectives consider that approaches based on purely economic explanations lack the necessary elements for an adequate understanding of the particularities of a firm's international behaviour (Fillis, 2001). This section aims to briefly review studies that bring a behavioural perspective to internationalisation in order to arrive at key behavioural determinants of the phenomenon. Some emphasis is given to research specifically focused on small and medium-sized enterprises (SMEs) internationalisation, thereby bringing to light specific aspects of the internationalisation behaviour of smaller firms (Coviello and McAuley, 1999).

Export Development Studies

Setting out from a macroeconomic perspective supported by international trade theories, export-development and -performance research has moved progressively into more behavioural considerations to explain firm-specific aspects of behaviour related to trade. Despite considerable empirical knowledge in the field of exporting enquiry, Leonidou and Katsikeas (1996) assert that the field is eclectic and no widely accepted theory is available, and Zou and Stan (1998) argue that this is due to the lack of synthesis and assimilation of fragmented knowledge.

Starting with Leonidou and Katsikeas' (1996) review, it can be noted that several export models have been developed since the 1970s, based on the assumption of an evolutionary process in a firm's involvement in exports, with all emphasising the stages/phases/levels of export development. The authors separate the most common explanatory variables tested in those models into four major groups: (1) facilitators or inhibitors: managerial characteristics, management style, organisational determinants, organisational resources; (2) information needs and requirements; (3) factors acting as stimuli or barriers; (4) market selection, entry and expansion. With a strong basis in the marketing discipline, as Leonidou and Katsikeas observe, all studies but one focused on SMEs, assuming that the internationalisation path is more applicable to smaller firms. The authors conclude that, drawing from the models examined, the export development process could be divided into three broad phases: pre-engagement, initial, and advanced phase.

Differently from the previous authors cited, the review made by Zou and Stan (1998) of 50 empirical studies, predominantly focused on SMEs, emphasises some advances in the theoretical foundation of export-performance research. Nevertheless, they contend that consistent conceptualisation and measurement of export performance is still lacking. Examining the multiplicity of factors proposed by researchers, they offer a useful classification for the determinants of export performance based on two dimensions: internal *versus* external, and controllable *versus* uncontrollable, attaching different theoretical bases to the dimensions. In Zou and Sta's (1998) analysis, the resource-based theory provides the theoretical arguments for internal factors, while the industrial organisation (IO) theory can offer the logic to explain the external factors. In Table 3.1, Leonidou and Katsikeas' (1996) and Zou and Stan's (1998) surveys of exporting studies are summarised.

Internationalisation Studies

The Uppsala Internationalisation Model was originally developed in 1977 by the Swedish scholars Johanson and Vahlne and became known as the Uppsala Model. It is regarded as a learning model of the internationalisation process (Forsgren, 2002; Johanson and Vahlne, 2006) of which the basic assumption is that internationalisation is a gradual and sequential process based on the interplay between two sub-processes: experiential learning and commitment to international business.

Uppsala scholars do not perceive internationalisation as “the result of a strategy for optimal allocation of resources to different countries where

alternative ways of exploiting foreign markets are compared and evaluated” (Johanson and Vahlne, 2006, p. 35). Rather, foreign-investment behaviour is seen as a consequence of a focal company’s strategy to increase its long-term profit, keeping risk-taking at low levels, by gradually committing resources into foreign-market activities through market-specific and experiential knowledge. In this sense, the model contrasts with basic assumptions of rational calculative decisions made by dominant economic paradigms (Buckley et al., 2007). Such a behavioural approach emphasises that managers make foreign- market entry decisions based on gradual learning and experience which lead to increased managerial commitment to foreign markets.

The concept of psychic distance is one of the main theoretical elements of this paradigm, and can be defined as:

“The sum of factors preventing the flow of information from and to the market. Examples are differences in language, education, business practices, culture and industrial development.” (Johanson and Vahlne, 1977, p. 33).

Under the Uppsala view, it is argued that internationalisation of a firm is affected by the compatibility between its experiential knowledge and its resource capabilities. Also, the greater the perceived psychic distance of the potential foreign market, the less likely that country will be selected (Johanson and Vahlne, 2003).

Since its initial development, the Uppsala Model and its staged approach to internationalisation has been the focus of extensive research and is considered one of the major paradigms in internationalisation studies

(Bilkey and Teasar, 1977; Cavusgil, 1980; Davidson, 1980; Luostarinen, 1980; Johanson and Vahlne, 1990; Welch and Luostarinen, 1994; Forsgren, 2002; Johanson and Vahlne, 2003; Johanson and Vahlne, 2006; Johanson and Vahlne, 2009).

Johanson and Vahlne (2006) argue that, after almost three decades since its original version and several other studies using the model, the interplay between two of the main model's concepts – knowledge development and foreign market commitment – and how they relate to opportunity development, deserve more empirical attention.

In recent years, there has been also some attempt to reconcile the Uppsala Model with other theoretical traditions. For example, some authors have suggested that “rational” approaches such as FDI theories and a process model of internationalisation can be linked, on the basis that the process of managerial learning allows the firm to internalize its activities by moving over time from domestic operations to establish host-country production, and that this can be used to explain internationalisation patterns (Coviello and McAuley, 1999; Buckley et al., 2007).

Another attempt has been made by Johanson and Vahlne (2003; 2006; 2009) to integrate the business-network model of internationalisation and the internationalisation-process model. In a paper (Johanson and Vahlne, 2006) the authors argue that after the original model was developed they realised that the two sub-processes, experiential learning and commitment building, occur as interplay between at least two (potential) partners. Thus they tied the process mechanisms to the network view of

internationalisation, incorporating business-network relationships of interconnected firms.

Internationalisation models following the Uppsala school have been criticised for: (1) being valid only to the early stages of the internationalisation process (Forsgren, 1989); (2) being deterministic and not paying attention to the internationalising firm's surrounding context; (3) excluding other options of strategic choices; (4) not paying attention to the acquisition choice as a route to internationalisation (Melim, 1992); (5) taking incremental learning as the main factor explaining a firm's international behaviour; (6) neglecting the importance of individuals' influence on internationalisation patterns; (7) focusing the discussion at the firm's level and not at the level of the firm's environment (Andersson, 2000); and (8) treating time superficially in classifying stages of internationalisation (Crick and Spence, 2005).

Examining the extant work in this stream of research, it is apparent that in recent years theoretical and empirical efforts have been made, on the one hand, to maintain the basic concepts of the model, and, on the other, to review, widen, and link them with other partially connected approaches, such as the international entrepreneurship, and business network, models (Johanson and Vahlne, 2003; Johanson and Vahlne, 2009).

In conclusion, despite several criticisms, the influence of the Uppsala model on research in internationalisation cannot be denied. For example, in his review of internationalisation studies Fillis (2001) notes that SME behaviour is predominantly described using a process view. Also, the review of international new ventures (INVs) studies done by Zahra (2005) concludes that internationalisation is not a one-shot deal, implying somewhat the

developmental nature of internationalisation. A summary of both reviews is outlined in Table 3.1.

The Resource-based View (RBV) of strategic management is a theory developed from the seminal writings of Penrose (1959), and from strategy scholars (such as Chanders, 1962; Andrews, 1987), which helps to identify important internal determinants of a firm's internationalisation process. According to this view, resources and capabilities, defined as: *“all assets, capabilities, organisational processes, firm attributes, information, knowledge, etc controlled by a firm to conceive of and implement strategies that improve its efficiency and effectiveness”*, are important determinants of a firm's performance and unique strategic position in the market (Barney, 1991, p.101).

Such unique configuration of resources provides the basis for achieving competitive advantage. Therefore, the RBV assumes that firm-specific attributes, rather than the overall industry environment, are the basis for competitive strategies. Yet firms can choose strategies that better utilize the pool of resources (Madhok, 1997) and they may be transferable across the boundaries between firms. In line with this assertion, some scholars revisited the RBV, proposing that a number of resources such as network ties, institutional linkages, and regional collaborative arrangements among enterprises may be external to a firm (Malmberg and Maskell, 1997; McEvily and Zaheer, 1999). The existing resources of a firm may limit or broaden its market expansion strategies. Arising from these assumptions, a resource-based perspective on internationalisation is emerging, as Ruzzier et al. (2006) emphasise.

Some researchers in the international business field have applied the RBV, and some of its evolutionary variants, and conjecture that it is helpful in explaining: a multinational firm's international growth strategy (Tseng et al., 2007); the role of knowledge in accelerated internationalisation processes of firms (Weerawardena et al., 2007); and, more specifically, the internationalisation of SMEs (Ahokangas, 1998; Loane and Bell, 2006).

The Network Approach derives from the concerns of scholars and practitioners with the evident phenomenon of interorganisational relationships in complex modern economies. Since its earlier stages, in the 1980s, pioneered by the European International Marketing Purchasing (IMP) research group, it has developed rapidly as a “competing theoretical explanation to inform cooperative behaviour in business” (Faulkner and Rond, 2001), focusing entrepreneurial firm behaviour in the context of organisational boundaries that incorporate a network of evolving exchange relationships by various network members.

Network thinking was later influenced by studies by the original IMP research group which sought to understand the nature of single buyer-seller relationships within the framework of the “interaction approach” (McLoughlin and Horan, 2002). Because of its historical origins, the theoretical foundations of the network approach are strongly influenced by the contributions of several Scandinavian researchers who adopted case-study methodologies as a tool for generating the new theory and for examination of the conceptual frameworks developed.

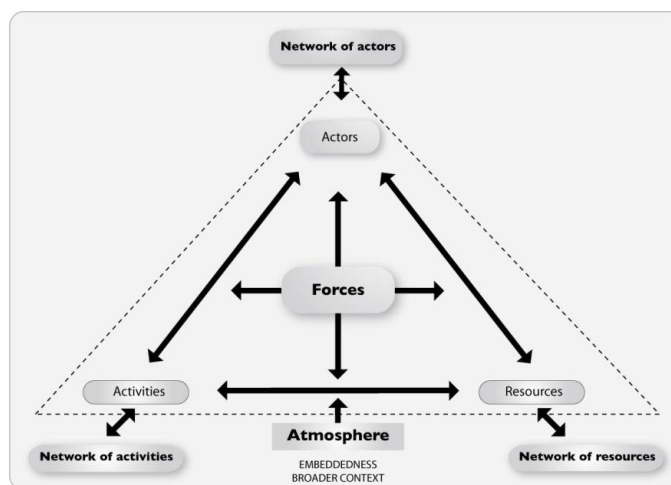
In parallel with this European tradition, in the United States network studies were dominated by social-network theories and sociological

approaches, as emphasised by Johannisson and Monsted (1997). In this way, at the theoretical level, the network approach is also grounded on sociological concepts such as the embeddedness of economic and social action (Granovetter, 1985; 1992; 2002; Uzzi, 1997).

The network model comprises basically three intertwined elements in the overall structure of networks: (1) actors; (2) resources; and (3) activities, namely the ARA model, as proposed by Hakansson and Johanson (1992) and Hakansson and Snehota (1995). Hakansson and Johanson (1992) emphasise that the three elements are bound together by important forces such as functional interdependence, power structure, knowledge structure, and intertemporal dependence, making possible an integrated analysis of stability and development in an industry, and of the roles of actors and sets of actors as well.

In order to gain an understanding of the general framework of this approach, a diagram of the overall structure of networks can be drawn from the work of Hakansson and Johanson (1992), Easton and Araujo (1992) and Halinen and Törnroos (1998), as shown in figure 3.1.

Figure 3.1: A Model of Business Networks



Sources: Hakansson and Johanson (1992), Easton and Araujo (1992) and Halinen and Törnroos (1998)

Easton and Araujo (1992) identify four important types of non-economic exchange relations in networks: (1) competitor relationships, which may exhibit elements of cooperation; (2) complementary supply relations, which can require direct, formal cooperation; (3) relations between firms and third parties such as governmental and research institutions, which may facilitate access to resources such as information, finance, and other networks; and (4) potential relationships, which firms are either not aware of or may fail to take advantage of due to barriers to their development. Taking the network approach underpinnings, the authors argue that cooperation is a key ontological element in all inter-firm relationships and in particular helps to explain relationships such as those between market competitors. Cooperation is also seen as one of the mechanisms through which actors coordinate their activities.

Competition and cooperation are conceptually articulated and regarded as dialectical processes in the network framework, in contrast to the traditional dichotomist character of the majority of works from economics and strategic -management scholars, which see competition as the driving force in the firm's external environment and as a fundamentally opposed element to cooperation (Lecocq and Yami, 2002). As maintained by Axelsson (1992), the strategic dimension is incorporated into the network approach by going beyond the dominant idea in the literature of strategy of a single focal company competing with other firms in a faceless and totally competitive environment. He regards the environment as a total mixture of the cooperative and competitive, where firms are embedded in relationships

and where strategic action is not limited to any focal firm. Thus the strategy evolves gradually in the interaction between those firms.

According to the network model, internationalisation decisions emerge as patterns of behaviours influenced by various network members. Following the network reasoning, business networks are seen as a coordinating mechanism within domestic and international markets and a major advantage for the firms engaged (Axelsson and Easton, 1992; Easton and Araujo, 1992; Johanson and Mattson, 1993; Faulkner and De Rond, 2001). According to the network approach, business relationships with suppliers, customers, competitors, and other institutions are created and continuously developed over time; and require considerable investments, resulting in activities patterns, resource ties, and actor bonds (Hakansson and Snehota, 1995); thus the importance of long-term relationships (Björkman and Forsgren 2000; Hadley and Wilson 2003).

Based on the Uppsala model, Johanson and Vahlne (1990) applied a network perspective of gradual learning and development of market knowledge through networks. Also, a study by Johanson and Mattson (1993) proposed a typology of four internationalisation situations based on the degree of internationalisation of the firm and of the market (suppliers, customers, and competitors): (1) early starters (low-low), (2) late starters (low-high), (3) lonely international (high-low), and (4) international among others (high-high). The authors establish that the positions of a firm in a network and its relationships within current markets affect its success in entering new international markets.

Notwithstanding this theoretical improvement by Uppsala scholars, Coviello and Munro (1997) point out that the network approach goes beyond the stages model by viewing the internationalisation process as a consequence of strategic actions involving explicit linkages between the positions of network actors, not merely the result of continuous development of current production activities.

Reflecting a similar view, in a paper examining conceptual similarities and disparities between the distribution-channels, internationalisation, and network literatures, Ford (2002) argues that although the network approach is process-driven as it is in the Uppsala incremental model, it differs from the latter in that it does not infer internationalisation as a single-company-oriented strategy through the outward extension of its current operations or as an evolution of its network of relationships where the producer has the power to choose the routes to the market. In contrast to the latter notion, Ford suggests that the network view allows new insights into internationalisation as an interactive process whereby market entry may involve complex sets of relationships between competitors, suppliers, and customers, in one or more foreign markets.

Historically, studies examining internationalisation processes from a network perspective have mainly been concentrated on network processes, structure, operations and relationships of larger manufacturing firms from developed countries. Examples of such studies are those done by Axelsson and Johanson (1992); Easton and Araujo (1992); Fletcher (1996); Fletcher and Barrett (2001); Johnsen and Johnsen (1999); Andersson (2002); Schmid and Schurig (2003); Veludo et al., (2004); and Solberg and Durrieu (2006).

For example, a research study done by Solberg and Durrieu (2006) on a sample of 206 Norwegian exporters indicates that access to international networks contributes to shape a number of internationalisation strategies.

Fletcher (1996) applied the network paradigm to international countertrade transactions, addressing the issues of relationships and examining not only the changes to the transactions involved but also changes in terms of actors, activities, resources, atmosphere and structure in a longitudinal study of Australian-based cases. In a case study of four New Zealand-based small software firms, Coviello and Munro (1997) found that network relationships shaped foreign market selection and mode of entry, both facilitating and constraining their internationalisation activities.

Fletcher and Barrett (2001) explored the application of the concept of network embeddedness to internationalisation in a case study of an Australian large firm over a period of 40 years. By examining the environment in which the relationships are embedded, they postulate that managers who are parties to specific dyadic or triadic relationship in networks should take into account nonfocal relationships of multiple actors involved in both national and global environments.

Following a trend towards entrepreneurial-network studies in the late 1980s and 1990s, terminologies such as cooperative strategies, networks and interorganisational cooperation have evolved in studies aimed at exploring the role of networks and the emerging cooperative relationships of firms as vehicles for internationalisation (Perry, 1999). Some of these studies have claimed that relationships in business networks can increase the smaller firm's international competitiveness, by improving its ability to enter

new markets or to expand within existing ones (Johanson and Mattsson, 1988; Kalantaridis, 1996; Weaver and Dickson, 1998; Corò, 1999). Moreover, some authors have also recognised that the examination of the internationalisation efforts of SMEs can be enriched by the network perspective (Coviello and Munro, 1999).

As a result of this trend, empirical studies acknowledge that strategies of inter-firm linkages have an influence on the internationalisation processes of SMEs (Coviello and Munro, 1997; Welch et al., 1998; Coviello and McAuley, 1999; Rugman and D'Cruz, 2001; Mathews, 2002; Chetty and Wilson, 2003; Vissak and Roolaht, 2003; Gemser et al., 2004; Loane and Bell, 2006). Perhaps one of the most striking findings of the associations between the internationalisation of SMEs and the establishment of collaborative relationships in business networks is provided by Coviello and Munro (1997). In a study of small software firms the authors found that the internationalisation of such firms is driven, facilitated, and inhibited by network relationships.

Drawing from Ruzzier et al.'s (2006) review of SME internationalisation research (for a complete summary see Table 3.1) and from an examination of the extant literature, a summary of selected themes and authors in network research is presented in Table 3.2.

Table 3.2: Themes in Network Research

Research Themes	Authors
Network Importance to Small Firms	Hansen et al., 1994; Hara and Kanai, 1994; Kaufmann, 1995; Korhonen et al, 1996.
Network Influences on Small Firm Behaviour	Lorenzoni and Ornati, 1988; Dubini and Aldrich, 1991; Larson, 1991; Tjosvold and Weicker, 1993.
Network Influences in Small Firm Internationalisation	Lindqvist, 1988; Bonaccorsi, 1992; Welch, 1992; McDougall et al. 1994; Bell, 1995; Coviello and Munro, 1997; Johnsen and Johnsen, 1999; Chetty and Holm, 2000; Dennis, 2000; Mathews, 2002; Bernal et al., 2002; Gemser, 2004; Loane and Bell, 2006.
Network Influences in Larger Firms Internationalisation	Sharma and Johanson, 1987; Johanson and Mattsson, 1988; Axelsson and Johanson, 1992; Easton and Araujo, 1992; Johanson and Vahlne, 1992; Fletcher, 1996; Johnsen and Johnsen, 1999; Fletcher and Barrett, 2001; Andersson, 2002; Chetty and Wilson, 2003; Schmid and Schurig, 2003. Veludo et al., 2004; Solberg and Durrieu (2006).
Impact of knowledge embedded in long-term social relationships on internationalisation	Davidsson and Honig, 2003; Hoang and Antoncic, 2003.
Network relationships influences in other internationalisation issues	<ul style="list-style-type: none"> -Foreign market selection: Anderson and Buvik, 2002; -Market servicing: Welch et al., 1996; -Dynamics of entry: Meyer and Skak, 2002; -International market development and marketing-related activities: Coviello and Munro, 1995; -Time of internationalisation: Oviatt and McDougall, 1994; -Propensity to export: Westhead et al., 2001; -Strategic choices and performance: Peng and Luo, 2000; -Degree of Internationalisation: Brush et al., 2002; -Speed of export by information acquired: Bonaccorsi, 1992

In the context of internationalisation, there are many ways whereby business-networks relationships may be significant to firms: (1) in both market selection and mode of entry (Loane and Bell, 2006; Bell, 1995); (2) by providing better, closer, and more agile relationships with the final customers and greater responsiveness to market uncertainty (Overby and Min, 2001); (3) in fine-grained information transfer and joint problem-solving arrangements (Solberg and Durrieu, 2006); (4) in helping competitor-based networks to acquire international reputation for products in foreign markets (Chetty and Wilson, 2003); and (5) by providing useful knowledge on international markets (Loane and Bell, 2006).

If network participation can offer both opportunities and constraints for firms, an essential aspect for the internationalisation of firms is the extent to which they are capable of utilising existing or potential interorganisational relationships as an element of their competitive strategies (Johanson and Vahlne, 1992; Oviatt and McDougall, 1997; Chetty and Wilson, 2003). Hence, SMEs need to be embedded in a network of external connections on both the supply side and demand side, some of which may develop into strategic collaboration towards internationalisation (O'Farrell and Wood, 1999).

Some authors have acknowledged the contributions and limitations of the network approach to internationalisation. For example, Loane and Bell (2006) argue that one of the strengths of the approach is that it illuminates understanding of the internationalisation phenomenon by explaining how actors, resources and activities within the network shape this process. Among the shortcomings and neglected factors within this research stream, researchers point out that: (1) it concentrates on large and/or manufacturing firms (Vissak, 2004); (2) it does not examine the importance of decision-maker and firm characteristics (Chetty and Holm, 2000; Vissak, 2004; Loane and Bell, 2006); (3) it ignores external factors driving a company towards internationalisation such as unsolicited orders and government policies (Vissak, 2004); (4) it neglects the strategic elements of the development and international growth of firms, due to the emphasis on relationships in networks, and (5) it lacks predictive power due to the difficulties in establishing cause and effect associations between networks and internationalisation (Loane and Bell, 2006).

The Economic Sociology View of Market Exchanges, in line with the network paradigm, argues that economic action is socially embedded in ongoing networks of relationships rather than being represented by a set of actions by atomised actors, as mainstream economic theory posits (Granovetter, 1973; Granovetter, 1992; Granovetter and Swedberg, 1992). Since this is the basic assumption of this study, this section aims to provide a brief account of the importance of economic sociology to the study of market exchanges.

The contribution of sociologist Mark Granovetter is undoubtedly one of the strongest influences in the contemporary economic sociology field, and has drawn attention to the problem of undersocialised or oversocialised views of business relations, abstracted out of their social context, which led to the proposition of the key concept of embeddedness, as a middle ground between these two contrasting views (Granovetter, 1985). According to Granovetter, the actual patterns of relations between firms by which economic transactions are carried out, embedded in broader systems of social relations and macrostructural circumstances, strongly affect economic action and are more important to the explanation of market exchanges than is supposed in the markets and hierarchies approach proposed by Williamson (1975).

According to Halinen and Törnroos (1998) the concept of embeddedness proposed by Granovetter (1973; 1985) implies that business firms, and the networks which they form, are both socially and historically constructed, and the dependence of business actors on one another, on the

broader contextual setting, and on the past, present, and future time has to be taken into account (p. 189).

As a result of these earlier contributions, in recent years, both economists and sociologists have increasingly recognised that the analysis of business networks may improve the understanding of economic behaviour and outcomes, as Zuckerman (2003) emphasises. For example, a sociological study of Silicon Valley's networks by Castilla et al. (2000) highlights that the kind of ties which connect networks of small firms to larger firms, as well as the relationships among different institutions in the Valley, help to explain its economic success. The authors note that in Silicon Valley networks have special importance in the movement of labour, the evolution of power, and the actual production of innovation (p. 219).

Within the economic sociology view, network connections affect such economic outcomes for five main reasons: (1) being a source for the flow, quality, and diffusion of novel information through "the strength of weak ties"; (2) being a source of reward and punishment; (3) being a source of entrepreneurial innovation and its diffusion by pulling together unconnected resources; (4) being a source of trust and common understanding through repeated interactions within stable situations, or, on the contrary, an inhibitor for flexible behaviour when changes are needed to survive in varying market conditions (Granovetter, 2005).

Notwithstanding the relevance of sociological perspectives, research in the area of small firm internationalisation has focused mainly on the economic rationale of collaboration, showing a need for sociological explanations that take into account the particular context in which exchange

relationships occur (Arino, 2001). This consequently suggests that sociological conceptualisations can illuminate our understanding of behavioural aspects overlooked by the economics based literature. Thus the rationale provided through the combination of the network approach with economic sociology is an important resource for scholars interested in studying the role of business networks in firms' internationalisation processes.

The Early Internationalisation Approach is a newer stream of research from the beginning of the 1990s which views internationalisation, especially in the context of SMEs, as a process of entrepreneurial behaviour. According to the theory developed by Oviatt and McDougall (1994; 2005), while many established firms may follow an incremental path of international development, other more dynamic and newly founded technology-oriented small firms are internationalising from inception. In this sense, perhaps no other stream of research has challenged so radically what the stages models have suggested.

Oviatt and McDougall (1994) conceptualise that, based on the assumption of resource constraints of small entrepreneurial firms, four basic elements are essential to successful new-venture internationalisation: (1) internalisation of a minimal proportion of assets, (2) adoption of less costly governance mechanisms such as network structures; (3) possession or production of private knowledge; (4) sustainability through one or more means of protection: imperfect imitability, licensing, networks, and direct means, such as patents.

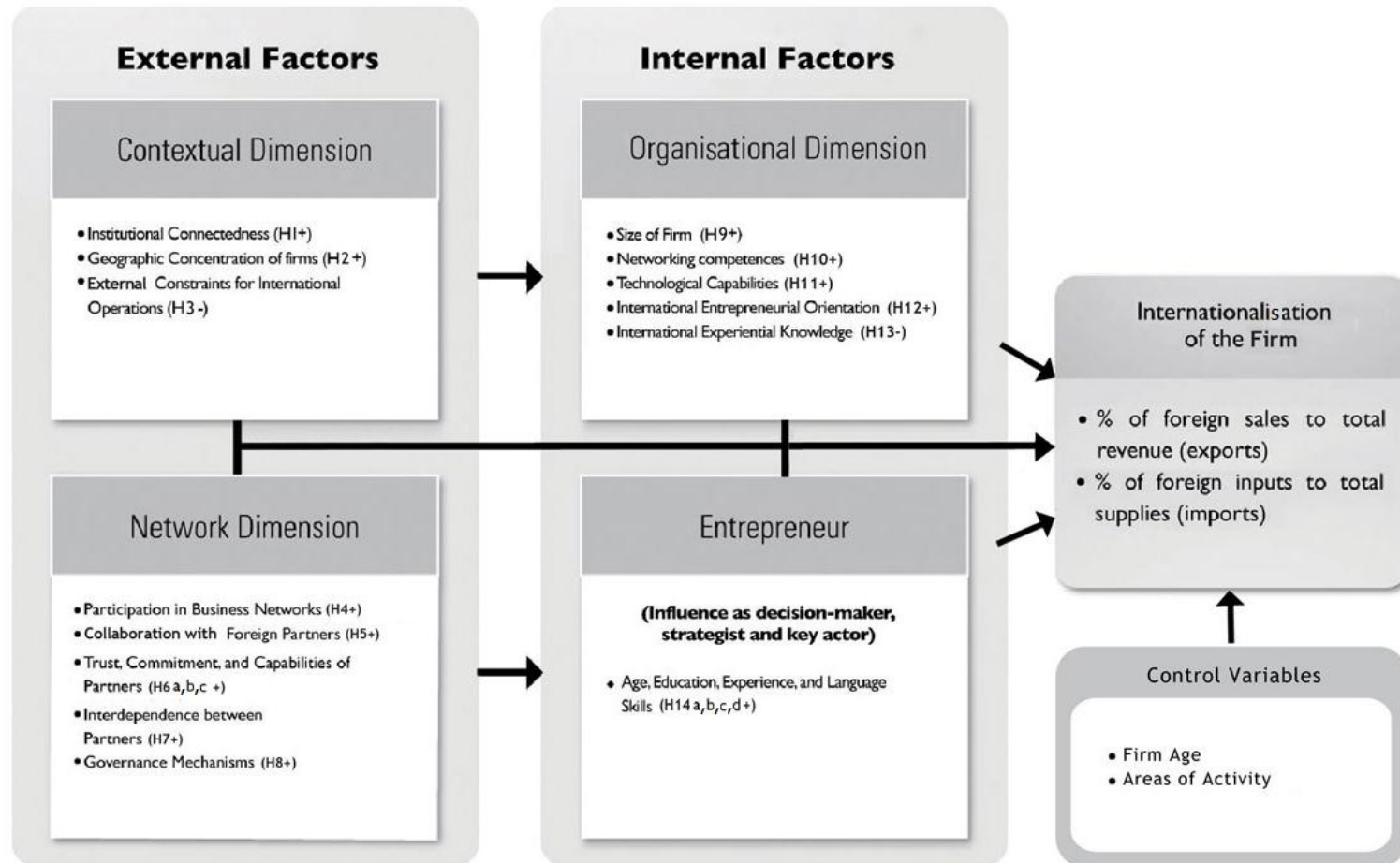
Since the earlier work by Oviatt and McDougall, several studies in this new stream of academic inquiry have proliferated using a variety of terms such as international new ventures (INVs), born-globals, global start-ups, and so on (Bell, 1995; Coviello and Munro, 1995; McDougall and Oviatt, 1996; Madsen and Servais, 1997; Jones, 1999; Knight and Cavusgil, 2004; Crick and Spence, 2005). Explaining the emergence of the growing phenomenon of early internationalisation in a review of literature in this field, Rialp et al. (2005) identify four driving forces that enable SMEs to compete globally: (1) new market conditions, in particular the increased importance of niche markets for SMEs, (2) technological developments in the areas of production, communication and transportation, (3) the increased importance of global networks and alliances, and (4) more sophisticated capabilities of people, in particular those of the founders/entrepreneurs. Several factors determining the international expansion of early international firms have been identified by authors within this field. Rialp et al. (2005) identified ten factors occurring in the internal or external environment of the firm that appear to stimulate the early internationalisation phenomenon (see Table 3.1).

Nevertheless, the review of this emergent school of internationalisation reveals certain gaps. First, the relationship between early internationalisation and long-term performance has not been yet established. Second, examining the empirical literature in this area it is not clear whether the early internationalisation phenomenon is restricted to high-tech industries, in which most of the research has been done, or whether it can be extended to more traditional industries.

3.4 Determinants of Internationalisation

By synthesising the findings of the existing literature, as detailed in the previous section, the focus of this section is to examine the key determinants of internationalisation by addressing the shortcomings and neglected factors within the network approach that several authors have pointed out (Chetty and Holm, 2000; Vissak, 2004; Loane and Bell, 2006). Also, the literature suggests that a combination of issues affect the internationalisation of firms and should not be viewed in isolation (Crick and Jones, 2000; Bell et al., 2004; Crick and Spence, 2005; Spence and Crick, 2006). Hence, contextual, organisational, network, and entrepreneurial determinants are integrated into a theoretical framework that synthesizes key variables from distinct approaches which lead to a set of hypotheses to be empirically tested in this study, as can be seen in Figure 3.2, offering a novel perspective for analysing and explaining the internationalisation of firms. The determinants can be classified into external and internal. External determinants refer to external environment factors that shape the context in which firms operate. Internal determinants refer to the firm's internal environment, both at the firm and entrepreneur-level. While the reviewed literature is focused largely on SMEs, the researcher takes a more specific view in this study by applying the theoretical framework particularly to software firms – the majority of them of micro and small size (see Chapter 2) – from an emerging economy country, Brazil.

Figure 3.2: Integrative Theoretical Framework of the Study



3.4.1 Dimensions of the Framework and Hypotheses

Contextual Dimension-related Factors

Several contributions within the export development and internationalisation literatures indicate that contextual conditions affect the extent, speed, and scope of firm internationalisation (Leonidou and Katsikeas, 1996; Zou and Stan, 1998; Crick, 2004; Jones and Coviello, 2005; Zhu et al., 2006; Aspelund et al., 2007; Zuchella et al., 2007; Cheng and Yu, 2008). Yet, despite the acknowledged importance of external factors, Aspelund et al. (2007) argue that they are largely neglected by stages models and entrepreneurial research. For this reason, this study considers the influence of macro and micro contextual-related factors on the internationalisation of Brazilian software firms.

Also, industry-clustering approaches should not be neglected in regard to the role of location in business networks as they are spatially embedded in different types of international, national, regional and local networks (Halinen and Törnroos, 1998). The literature review indicated three factors that provide further insight into contextual conditions which might impact the internationalisation of firms, referring to the institutional connectedness of a firm; the geographic concentration of firms; and the external constraints for international operations. These are discussed in the subsequent parts of this section.

Institutional Connectedness

Drawing on the contributions of economic sociology, the network approach incorporates the concept of embeddedness, proposed by authors such as Granovetter (1992) and Halinen and Törnroos (1998), essential to understanding the contextual dimension and to examining the broader environment in which firms operate. This concept not only encompasses the multiplicity of wider networks in the environment of the firm, and the temporal and spatial character of its relationships and networks. It also helps to draw attention to the socially constructed nature of entrepreneurial activities in business networks.

One of the key common assumptions in the varied industry-clustering theoretical strands is that actors are embedded in an institutional context, accounting for spatial and historical contexts (Markand and Truffer, 2008). Such interconnected relationships in which firms are embedded entail direct relations between a focal firm and its suppliers, customers, expert organisations, research institutions, service providers, industry partners, and governmental institutions, among other actors, that can be located either in domestic or international markets. Following this line of thinking, business-networks research has begun to introduce the concept of embeddedness for describing and explaining network dynamics and evolution (Halinen and Törnroos, 1998; Fletcher and Barrett, 2001).

Halinen and Törnroos (1998) explain the network dynamics, and the nature of the broader network environment in which firms are embedded, at three levels: (1) the embeddedness of focal actors in a network; (2) the

dyadic-network embeddedness of relationships between two actors in a network; (3) the micronet-macronet embeddedness of a specific network embedded in a broader network of national and/or institutional actors, which exert an influence on the network and its activities. These three distinct embeddedness levels allow the consideration of micro and macro dimensions as well as their linkages.

Fletcher and Barrett (2001) argue that, in order to understand how international business networks evolve and function, it is necessary to understand how the political, social, technological, infrastructural, market, regional, and institutional networks operate. They point out that a range of factors from the wider context, in which actors are embedded, impact both the network and the access that actors have to resources. As a result, the nature and quality of the connections and co-ordination mechanisms between business actors and other institutional actors, such as technical, research and regulating institutions, may have a critical influence in creating an enabling institutional framework for fostering the internationalisation processes of firms. Furthermore, the significance of institutional linkages is shown in an empirical study of institutional and organisational factors in outward FDI relationships of Chinese firms by Yiu et al. (2007). The authors report that institutional networks play an even more significant role than business networks for firms in emerging economies venturing internationally. Hence, based on the literature review, hypothesis 1 is developed:

Hypothesis 1: The institutional connectedness of a firm is positively associated with the likelihood of its internationalisation.

Geographic Concentration of Firms

Many of the industry-clustering related schools of thought have their roots in the Italian districts phenomenon, which has led to the proliferation of a range of studies in different countries, drawing on the unique cooperative behaviour of networked firms and its interrelation with a special form of spatial organisation, commonly known as industrial districts, as a source of competitive advantage (Sengenberger and Pyke, 1992; Porter, 1998; Schmitz, 1999; Reddy, 2000; Pietrobelli, 2002).

It was however Marshall (1890), as Fioretti notes (2008), who first coined the term industrial district for his account of Sheffield's cutlery industry in which a distinctive culture of doing business emerged through the combination of competition and collaboration among geographically concentrated small firms.

The emergence of the industry-cluster phenomenon in several countries such as Italy, France and the US, therefore, has helped to put forward theoretical arguments that geographically concentrated firms in clusters may overcome major constraints to competing in global markets (Altenburg and Meyer-Stamer, 1999; Mittelstaedt et al., 2006). Because of their focus on geographical or territorial determinants, clustering approaches are a relevant complement to internationalisation research predominantly focused on network-specific, firm-specific or individual entrepreneur-related variables, and hence need to be taken into account in the empirical analysis of firm internationalisation. Also, researchers of the early internationalisation phenomenon have begun to recognise that local networking among small

firms, territorial advantages, and location-specific factors are relevant drivers of internationalisation for small firms (Zucchella et al., 2007).

For the reasons stated above, the influence of location in business networks needs to be accounted for within this study. Therefore, the commonalities of different strands of industry-clustering approaches are explored in order to arrive at key conceptualisations applied to this research. Many authors such as Bertini (1998), Rabellotti and Schmitz (1999), Schmitz (1999), and Pietrobelli and Rabellotti (2006) recognise common ideal-typical features of industrial districts such as predominance of small and medium-sized firms (SMEs); geographical proximity of SMEs; sectoral specialisation; close inter-firm collaboration; collective efficiency; active self-help organisations; and supportive regional and municipal government.

These model features, however, need to be empirically examined, as suggested by evidence coming from investigations such as Rabellotti and Schmitz's (1999) embracing Mexican, Italian and Brazilian footwear industrial districts. Their findings suggest that the notion of collective efficiency, for example, does not mean that firms located in internationally competitive industrial districts have a similar performance or present a high degree of homogeneity. According to the study, they vary in size, performance and strategies, and in the growth they achieve individually, although their competitiveness and growth can only be understood by reference to the collective dimension of the system.

As a result of the commonly held belief that firms' competitiveness can be boosted by collective efficiencies achieved through geographical

clustering, which the extensive literature in this field has helped to disseminate, cluster-development policies have proliferated in Latin American countries without taking a comprehensive approach that accounts for both the development of local competitive factors, and networks and linkages factors, as highlighted by Pietrobelli and Rabellotti (2006). The authors also assert that the literature on clusters often concentrates on local sources of competitiveness, neglecting the increasing importance of international linkages and the need for firm-level efforts for innovating and entering new markets.

Moreover, drawing attention to some of the shortcomings of the traditional view on districts, a study by Boschma and Ter Wal (2005) argue that the role of geographical proximity has been overemphasised, overlooking differences of competencies between local firms in districts and non-local relationships. The authors stress that “it is essential to disentangle analytically the impacts of the firm, the network and the place on the performance of firms in a cluster” (p. 20). Considering the specific effects of geographical concentration of firms in a territorial area and the likelihood of collaborative arrangements for access to international markets in business networks between them, the following hypothesis is formulated:

Hypothesis 2: The geographical concentration of firms is positively associated with the likelihood of the internationalisation of a firm.

External Constraints for International Operations

Because of the challenges involved in international operations, the recognised scarcity of internal resources, and the odds of an SME's failure, the perceptions of SMEs' managers on external constraints to operations in international markets may be heightened. Hence entrepreneurs' perceptions of the risks and constraints associated with internationalisation shape their strategic decisions (George et al., 2005). Furthermore, some researchers argue that the managers' perception of obstacles to exporting might be associated with long-term continuance in exporting (Da Silva and Da Rocha, 2001) and that small, entrepreneurial firms, when engaging in the global economy, are more dependent on their environment than their larger counterparts (Mittelstaedt et al., 2006).

It is the export literature that offers a broader range of empirical evidence for external factors as significant determinants of a firm's international performance. For this reason the choice of external environmental factors to be tested in this study as important determinants of internationalisation was guided primarily by exporting studies. With a policy-oriented focus, many studies have identified the perceptions of external problems and barriers by actual or potential exporters as determinants of a firm's internationalisation (Barrett and Wilkinson, 1985; Cavusgil and Naor, 1987; Cavusgil and Zou, 1994; Baldauf et al., 2000). These factors affect organisations in general and shape the context in which domestic SMEs operate.

Examining the literature, external determinants of firms' international performance can be classified into two groups. First are the constraints perceived in the domestic market, such as access to external sources of financing, complex documentation requirements, unfavourable state of the domestic economy, lack of government export assistance or national export policy, and lack of access to overseas market information (Katsikeas, 1994; Leonidou and Katsikeas, 1996; Zou and Stan, 1998; Da Silva and Da Rocha, 2001). The second group comprises foreign-market characteristics which are perceived as barriers by firms wishing to operate in international markets, such as a foreign market's general business environment, tariff/non-tariff barriers, cultural differences, intense competition in international markets, and geographical distances (Kwon and Knopa, 1993; Zou and Stan, 1998; Baldauf et al., 2000; Da Silva and Da Rocha, 2001; Whitelock and Jobber, 2004). This leads to the following hypothesis to be tested:

Hypothesis 3: The perceived external constraints for international operations by a firm are negatively associated with the likelihood of its internationalisation.

Network Dimension-related Factors

As network-related variables are key explanatory factors in this study, it is necessary to define and clarify major concepts. One of the big difficulties in employing network research is that there are multiple meanings attached to the network concept (McLoughlin and Horan, 2002). In this study, starting with the definition of a business network itself, the focus of attention is on

“ego-networks” (Borgatti and Foster, 2003), that is, networks from the perspective of the single firm, as an economic actor, not as a whole entity.

According to Borgatti and Foster (2003) ego-network studies blend a network-theoretic perspective with conventional individual-oriented methods of collecting and processing data (p.992). A business network is therefore conceptualised and investigated in this thesis from a single firm’s point of view. As such, drawing from Cook and Emerson’s (1978), Axelsson’s (1992), and Borgatti and Foster’s (2003) notion that networks are sets of two or more connected exchange relationships connected by a set of ties, this study employs the following definition:

“A Business network means an intentionally created and organised collaboration between two or more actors (firms or institutions) which goes beyond a specific task, with the purpose of achieving a common objective.”

Using existing network studies, five salient elements of business networks are identified and considered, with the aim of understanding key determinants of successful business networks: collaboration relationships; collaboration with foreign partners; critical success factors in business networks; interdependence between network partners; and governance mechanisms. The network literature suggests these factors may influence network collaboration leading to a firm’s internationalisation, and thus each will be examined in the remainder of this section.

Participation in Business Networks

The network approach offers a special contribution when studying the phenomenon of collaboration because of the ontological convergence of the latter with the network theory. The strategic view of networks argues that collaboration can take the form of collective strategies between competitors (Fombrun and Astley, 1983) and that these relationships can create and sustain competitive advantage (Cunningham and Culligan, 2002). Beginning from a strategic management perspective in comparison with the network perspective, Gadde et al. (2003) take a relational view of strategy, acknowledging the significance of interdependent business relationships as strategic resources and as part of an interactive and evolving strategy process.

Axelsson (1992) recognises the concept of collective strategy as involving collaboration or joint action by organisations in business networks on matters of strategic importance. Expanding this notion, Child and Faulkner (1998) argue that cooperative strategies, in the form of strategic alliances between competitors, amount to a further domain of policy options and represent a direct response to major strategic challenges or opportunities which firms face.

Several researchers acknowledge collaborative relationships through networks as having an important effect on the internationalisation of firms (Bell, 1995; Oviatt and McDougall, 1995; Coviello and Munro, 1997; Crick and Jones, 2000; Ellis, 2000; Chetty and Campbell-Hunt, 2003). Others emphasise that overlapping network processes may give rise to conflicts and contradictions between a firm's individual and collective actions, causing

actors to change direction in the internationalisation process (Andersson, 2002). Furthermore, Bernal et al.'s (2002) empirical study shows that collaborative advantages between networked small and medium-sized freight forwarders enable them to operate in international markets. Also, a study by the European Network for SME Research (ENSR) (2003) indicates that foreign partnerships, including having collaborative relationships with foreign SMEs, represent viable ways to strengthen international strategies of SMEs. Considering the collaborative business networks' effects on internationalisation, the related hypotheses are as follows:

Hypothesis 4: *The participation of a firm in business networks is positively associated with the likelihood of its internationalisation.*

Hypothesis 5: *The collaboration of a firm with foreign partners is positively associated with the likelihood of its internationalisation.*

Critical Success Factors in Business Networks

Oliver (1990), in a review of the literature on interorganisational relationships, stresses the importance of understanding the conditions under which relationship formation may happen and evolve. Also, Solberg and Durrieu (2006) point out that a number of internationalisation strategies of the firm are affected by certain features of business networks, so that the characteristics of these networks should be explored further. Nevertheless, even though network connections have usually been studied as antecedents

of internationalisation, few studies have explored the behavioural dimensions of network relationships in a more comprehensive manner, investigating the effects they might have on the likelihood of a firm's internationalisation.

Several authors (Axelsson and Easton, 1992; Granovetter, 1992; Blankenburg, 1995; Möller and Halinen, 1999; Johnsen and Johnsen, 1999) point out that the following factors play an important role in networks, as bases for collaboration: 1) trust; 2) mutuality; 3) position of actors; 4) complementarities; 5) common and conflicting interests; 6) level of communication; 7) perception of equally shared benefits; 8) strategic-cultural understanding; 9) characteristics and degree of competence of the company with which one collaborates; 10) relationship capability management; 11) strength of bonds; 12) information sharing; 13) the degree of dependence – which brings with it the issue of power and control.

Amongst these factors that facilitate relationships in business networks, trust is believed to form one of the fundamental enablers of sustaining relationships, lowering transaction costs, increasing knowledge sharing and encouraging partners to dedicate assets on behalf of others, and reducing the risks of opportunism (Nakamura et al., 1997; Dyer, 2000; Helfert et al., 2002; Sherer, 2003; Spekman and Carraway, 2006) – albeit that Spekman and Carraway (2006, p.18) warn us that although it may be “the glue that holds collaborative relationships together”, trust is fragile and subject to numerous stresses and tensions. Commitment, as an attitudinal component signifying an intention by the parties to develop and sustain a long-term relationship, is also an integral feature of successful relationships (Spekman et al., 1997; Dennis, 2000; Helfert et al., 2002; Sherer, 2003).

In an empirical study of critical factors that lead to the success of SMEs' business networks, Sherer (2003) indicates capabilities that network participants bring to the network as an important factor in 'hard' networks, classified as those which included either joint production or joint marketing. Therefore, each of these factors in isolation, or a combination of them, may impact on firms to promote or inhibit strategic collaboration between firms that fosters internationalisation. This leads to the following hypotheses:

Hypothesis 6a: *Trust in partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.*

Hypothesis 6b: *Commitment of partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.*

Hypothesis 6c: *Capabilities of partners in the business networks it belongs to are positively associated with the likelihood of the internationalisation of a firm.*

Interdependence between Partners

As Hertz (1992) points out, networks are not concerned simply with interdependence in a relationship between two actors, but also with other interdependent relationships connected to these actors. From this idea,

networks can have clusters of particularly interdependent firms. Thus, the degree of interdependence varies in networks. The relationships these firms have will themselves create new possibilities, which may in turn generate new forms of relationships. Therefore, interdependence is at the same time a source and a result of heterogeneity in networks (Easton, 1992). Furthermore, some researchers argue that interdependence, reflecting the extent to which a firm needs to maintain a relationship with a partner in order to achieve its goals, is a central construct to understanding exchange relationships (Smith and Barclay, 1999).

Analysing the main interdependency forms and co-ordination mechanisms operating in network structures, Nassimbeni (1998) point to the association between network structures, co-ordination mechanisms and four kinds of interdependencies: (1) interdependency in work flow through complementary production activities (direct supervision in supply networks); (2) interdependencies in processes of the work flow (process standardisation in regional industrial systems); (3) interdependencies of scale (input/output standardisation in production spinnerets; and skills standardisation in agreements and joint-ventures); and (4) interdependencies in embedded social relationships (mutual adjustments through informal communication processes, present in all network structures).

Interdependencies of Resources within Business Networks

Resources are key elements of business networks, according to the model developed by Hakansson and Johanson (1992). While acknowledging the importance of individual resources and capabilities for the

competitiveness of SMEs, the view that resources can also be leveraged from network relationships and activities offers a complementary theoretical explanation as to why and how smaller firms can secure a competitive position within either domestic or international markets. This assumption was empirically examined by McEvily and Zaheer (1999) in a study that shows that one important source of variation in the acquisition of a firm's competitive capabilities is its network embeddedness. Other empirical evidence comes from a study done by Bengtsson and Kock (2000) who observe that the driving force behind cooperative activities established between competitors within business networks is the heterogeneity of resources, as each competitor holds unique resources that sometimes give a competitive advantage and sometimes are best utilised in combination with other competitors' resources.

There are various forms of competitive advantages associated with network participation such as market power, lower transaction costs, shared risks, the generation of trust and commitment, facilitated exchange of experiences and knowledge between member companies, product-specific knowledge, increased scale to compete in larger markets through combined operations, as well as the ability to pool resources and competencies, as many researchers have recognised. (Barney 1991; Dennis, 2000; Gulati et al., 2000).

Business networks are therefore important sources of acquiring ideas, influences, information (Granovetter, 1973) and, also, foreign market knowledge (Eriksson and Chetty, 2003). A study on the internationalisation of New Zealand SMEs by Chetty and Wilson (2003) draws attention to financial,

physical, human, organisational, technical, and reputation resources that can be accessed through network relationships. The authors suggest that different internationalisation strategies and different types of networks will lead to different resource combinations by internationalising firms.

Amongst the various resources that can be pooled through business networks, both network and relational strategy researchers highlight foreign market knowledge as the most critical resource derived from network development for internationalising firms (Gulati, 1998; Chetty and Campbell-Hunt, 2003; Agndal and Chetty, 2007). Moreover, some authors recognise that the acquisition of foreign market knowledge through collaborative relationships in networks enables a firm to identify what type of foreign market knowledge it lacks, influencing the identification of market opportunities as well as the direction that an internationalising SME takes (Chetty and Campbell-Hunt, 2003; Eriksson and Chetty, 2003; Agndal and Chetty, 2007).

Furthermore, Gulati (1998) asserts that informational advantages through existing networks can also enable the formation of new alliances by three means: having access to information about potential partners; having informational benefits about potential partners at the right time; and receiving referrals from other network partners in alliance formation.

Finally, the acquisition of a strategic resource such as foreign market knowledge, including market standards, market intelligence, marketing opportunities, and innovative technologies, can be enhanced through collaboration with foreign partners, as a number of studies suggest (Wright et al., 2002; Knight and Cavusgil; 2004; Zhu et al., 2006).

Overby and Min (2001) state that firms operating in a market through co-ordination and interdependence built on relationships are dependent on the resources of each other through which gains are often made. Thus, it can be concluded that managing the interdependencies of resources is an important element in a network-oriented internationalisation strategy. Taken together, these aspects suggest the following hypothesis:

Hypothesis 7: Interdependence between partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.

Governance Mechanisms

According to Jones et al. (1997), governance mechanisms can facilitate and provide the conditions for relational exchanges through networks. The authors maintain that these mechanisms resolve fundamental problems of organising, adapting, coordinating, and safeguarding exchanges. Moreover, social mechanisms of network governance, such as restricted access to exchanges in the network, a system of widely shared assumptions, beliefs, and behaviours among independent firms, collective sanctions, and reputation, provide the basis for these exchanges to happen. They also maintain that network governance mechanisms can be characterised as “implicit and open-ended contracts” and may help to reduce transaction costs, gaining comparative advantages over markets and hierarchies.

In complement to the ideas offered by the network approach, governance mechanisms in collaborative relationships through networks can be better understood if the resource-based view (RBV) of the firm and the resource dependency theory (RDT) are combined. While the RBV provides support for the view that valuable resources can be made available outside the firm (McEvily and Zaheer, 1999), the latter offers a specific contribution to the understanding of governance mechanisms in networks.

The resource dependency theory developed by Pfeffer and Salancik (1978), starting from the notion that no organisation is completely self-contained, introduces the notion of power relations based on the exchange of needed resources. They propose that the relative magnitude of the exchange, measured by the proportion of total inputs or the proportion of total outputs accounted for by the exchange, and the criticality of the resource, defined as the ability of a firm to continue functioning in the absence of the resource or in the absence of the market for the output, affect the dependence of one organisation on another.

Jones et al. (1997) assert that governance mechanisms are critical to networks functioning effectively. They state that unlike dyadic relationships, which are managed by the organisations themselves, and unlike serendipitous networks, which have no formal governance structures at all, the activities of goal-directed networks must generally be managed and governed if they are to be effective.

Also, in a review of interorganisational networks, Provan et al. (2007) assert that network governance has not been examined explicitly in many of the network-level empirical studies. Neither can empirical evidence be found

of the significance of governance mechanisms for predicting a firm's internationalisation. This leads to the following hypothesis to be tested:

Hypothesis 8: *The existence of governance mechanisms in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.*

Organisational Dimension-related Factors

Factors around organisational characteristics and capabilities have been investigated as possible causes of internationalisation of firms (Fletcher, 2001). In this section the author explores the association between variables related to organisational characteristics which have attracted the attention of past research and are incorporated in the proposed framework of this study, and the internationalisation of firms.

It is believed that the network approach to internationalisation, the main theoretical underpinning of this study, can be enhanced by the consideration of firm-specific elements for two main reasons. First, firms, as business actors, are the agents of network relationships, and therefore need to be viewed as whole and complete entities, albeit embedded in the network and environment contexts (Axelsson, 1992). Second, the firm's resource-profile concept explored by Chetty and Wilson (2003), in which each firm has a unique profile, encompassing its history, culture, structure, resources, investments and capabilities, facilitates the understanding of how issues related to the organisational dimension are reflected at the network dimension.

As such, to capitalise on its participation in business networks, a firm must bring certain competences and resources in order to cope with the ambiguities and complexities of a continuous process of exchanges. Chetty and Wilson (2003) further argue that the ability of a firm to leverage externally-generated resources may be an important explanatory factor for a firm's international engagement.

Following this reasoning, it can be argued that organisational factors have an impact on exchange relationships. Hence, we may consider that one of the necessary conditions for effective collaboration among business actors is the convergence or compatibility of factors related to the organisational dimension.

Finally, studies on the early internationalisation of entrepreneurial firms suggest that organisational capabilities play an important role in this process (McDougal et al., 1994; Zahra et al., 2000). Thus, firm-specific characteristics and organisational-related factors that are likely to exert an influence on an SME's internationalisation will be discussed in the remainder of this section. The organisational dimension factors discussed in the following parts of this section comprise five variables: size of a firm; networking competences; technological capabilities; international entrepreneurial orientation; and international experiential knowledge.

Size of Firm

Many studies on internationalisation have addressed firm size as an explanatory factor for the limited abilities of SMEs to compete internationally. Although some studies maintain that size only limits the number of foreign

markets served and thus should not be perceived by managers as a barrier to international performance (Calof, 1993), many other studies in the international business literature point out that, because of resource constraints, small firms are unlikely to internationalise because of the effects of firm size, age, and lack of experience (Buckley, 1993; Jones, 1999; Baldauf et al.; 2000).

According to Calof (1994), there are three possible theoretical explanations regarding the impact of size on a firm's export behaviour: (1) smaller firms are at a resource disadvantage when compared to larger firms; (2) smaller firms may be more risk averse because of lack of information; and (3) smaller firms usually undertake growth within the domestic market first. Using this logic, the present study considers the impact that the size of a firm might have on the extent of internationalisation of firms. This leads to the following hypothesis:

Hypothesis 9: The size of a firm is positively associated with the likelihood of its internationalisation.

Resources, Competences and Strategic Capabilities

The resource-based view (RBV) draws from the strategic management literature and offers important contributions to understanding the key role that a firm's capabilities and resources have as distinctive, valuable, inimitable assets for competition and survival. The notions that firms are heterogeneous in their resource profiles and that resources are not perfectly mobile across firms form the underlying assumptions of the RBV of

the firm (Barney, 1991; Quintana-Garcia and Benavides-Velasco, 2004). Beginning conceptually from the RBV perspective, some authors recognise that knowledge-based internal capabilities are the most important resources that drive organisational performance for firms operating internationally (Knight and Cavusgil; 2004). Building on the notion of relationships as sources of capabilities, research done by Schmid and Schurig (2003) has also shown that relationships with external network partners, especially external market customers, can enhance the development of a firm's critical capabilities.

According to Teece et al. (1997), in regard to scarce resources, skill acquisition, learning, and accumulation of organisational and intangible assets, the RBV approach suggests the consideration of managerial strategies for developing new capabilities. As such, the authors highlight the key role of strategic management in adapting, integrating, and renewing organisational skills, knowledge, resources and functional competences to respond to shifts in the business environment. For Teece et al. (1997), to be strategic, competences and capabilities which are embedded within managerial and organisational processes must be honed to a user need, unique, and difficult to replicate. Following this notion, internationalisation studies are used to identify key strategic competences and capabilities that can enhance the resource profile of a networked, internationalising firm, as outlined and discussed next.

Networking Competences

Given the impact that network relationships may have on a variety of performance outcomes, in particular on the internationalisation of firms, as discussed earlier in this chapter, the ability of a firm to manage its network relationships becomes a key competence. Johanson and Vahlne (2003) point out that from a business-network perspective, the main barriers to international expansion are associated with relationship establishment and development. Thus the networking capabilities of a firm might have an important role in channelling relationships with partners.

Ritter (1999), however, is the scholar who postulates the concept of network competence as a firm-specific determinant for handling, using, and exploiting interconnected relationships in networks effectively. By assessing a firm's degree of network management qualifications and execution of management tasks, Ritter (1999) and Ritter and Gemünden (2003) have empirically shown that networking is integrated into the company and cannot be isolated out of this organisational context.

Notwithstanding the importance of networking relationships for a firm's internationalisation, the extant internationalisation research in its varied traditions has failed to incorporate networking as a capability in the internationalisation processes of small entrepreneurial firms (Mort and Weerawardena, 2006). If the development of relationships through business networks has effects on a firm's international performance this leads to the conclusion that a firm's competence to initiate, develop, monitor, and sustain its relationships with various external partners is crucial and will determine how successful these relationships may be in the achievement of common

goals of network partners. Considering these aspects, the following hypothesis is put forward:

Hypothesis 10: *The networking competences of a firm are positively associated with the likelihood of its internationalisation.*

Technological Capabilities

Given the fact that international competition is increasingly technology-based, the role of technological capabilities as major determinants of SMEs' export performance has been emphasised (Kohn, 1997; Lefebvre et al., 1999; Yang et al., 2004). However, as distinct from multinational companies that possess patented, sophisticated technologies which enable them to better exploit these technological capabilities in their international operations, small firms from newly industrialised economies, generally less technologically advanced, are unable to enjoy firm-specific advantages such as the benefits of market-for-technology host government policies when they invest abroad (Shi, 2001). Shi (2001) argues that the different kinds of technological capabilities possessed by small and large transnational corporations (TNCs) lead to different FDI strategies. Moreover, Aspelund et al. (2007, p. 1439) indicate that entrepreneurial firms possessing new advanced technology can leverage their competitive advantages in international markets. Thus, the following hypothesis is formulated:

Hypothesis 11: *The technological capabilities of a firm are positively associated with the likelihood of its internationalisation.*

International Entrepreneurial Orientation

The intersection between internationalisation and entrepreneurship processes has given rise to international entrepreneurship theories, drawn from the seminal work of Oviatt and McDougall (1994) on international new ventures (INVs). These theories have been developed based on the key assumption that new ventures do not necessarily need to own their resources in order to internationalise their operations (Zahra, 2005).

Although age of firm at internationalisation is a distinguishing feature in the international entrepreneurship research stream, Zahra (2005) suggests that how firms compete when they enter the global market is nonetheless the most decisive factor, irrespective of the age or size of a firm at international entry. This then indicates the need to consider firms' entrepreneurial characteristics, which follows next, when discussing firms' internationalisation.

In a study of entrepreneurial characteristics of French SMEs, Messeghem (2003) indicates that there are three common elements which characterise the entrepreneurial behaviour of firms: innovation, proactiveness, and risk-taking. Stevenson and Jarillo's (1990) notion of entrepreneurial management, seen as opportunity-based firm behaviour without regard to the resources a firm currently owns or controls, helps to understand why relatively resource-constrained SMEs, which lack a substantial asset base or market power, adopt flexible growth-oriented strategies such as entering new foreign markets or developing international operations.

Developing and testing a measurement instrument which taps distinct factors that represent important dimensions of Stevenson and Jarillo's conceptualisation, Brown et al. (2001) were able to operationalise and identify six dimensions of entrepreneurial management: (1) strategic orientation; (2) resource orientation; (3) management structure; (4) reward philosophy; (5) growth orientation; and (6) entrepreneurial culture.

An empirical study by Knight (2001) highlights the significance of having an international entrepreneurial orientation as an important driver of the international performance of SMEs. Also, Knight's findings stress that internationalisation preparation, entailing the conduct of market research, the commitment of resources to international operations, and the adaptation of products to suit foreign market requirements, appears to be an important strategic antecedent in the international performance of SMEs. The author asserts:

"An entrepreneurial posture enables managers to be more responsive to changes in their external environment by encouraging strategic competence and the development or adaptation of products and services better suited to (foreign) buyer needs" (p. 167).

Therefore, starting from an entrepreneurship perspective, researchers on international entrepreneurship have suggested the need to consider firms' entrepreneurial characteristics when discussing internationalisation (George et al., 2005; Zahra, 2005). The following is thus hypothesised:

Hypothesis 12: *The international entrepreneurial orientation of a firm is positively associated with the likelihood of its internationalisation.*

International Experiential Knowledge

Among two conceptualised types of knowledge – objective, acquired through standardised methods of collecting and transmitting information; and experiential – the Upsalla internationalisation model posits experiential knowledge of foreign markets as a prominent factor in a firm's internationalisation process, as Eriksson et al. (1997) emphasise. According to this view, by operating in the international market, experiential knowledge of the market, clients, commercial laws and norms, problems, and opportunities abroad are acquired (Johanson and Vahlne, 1977). Furthermore, Eriksson et al. (1997, p. 353) argue that “in internationalising, a firm must develop structures and routines that are compatible with its internal resources and competence, and that can guide the search for experiential knowledge about foreign markets and institutions.”

Looking at market knowledge, Johanson and Vahlne (1977) maintain that experiential knowledge is crucial in the marketing of complex and software-intensive products, as is the case under investigation in this research. Although experiential knowledge may be costly as a time-consuming and higher resource-commitment process, it is however a source of competitive advantage and its lack can be problematic for an internationalising firm (Eriksson et al., 1997). Thus, the following hypothesis is formulated:

Hypothesis 13: *The lack of international experiential knowledge of a firm is negatively associated with the likelihood of its internationalisation.*

Entrepreneur Dimension-related Factors

Collinson and Houlden (2005, p. 416) point out that the importance given to personal characteristics of small-firm entrepreneurs, as decision-makers in SMEs' internationalisation processes, varies according to distinct theories and frameworks of internationalisation, ranging from the economic rationale, at one end of the scale, to network relationship approaches at the other extreme. In fact, examining the internationalisation literature one can conclude that, to a greater or lesser extent, there is recognition that the entrepreneur plays an important role in internationalisation processes, especially in the case of smaller firms.

In a study that highlighted the role of the entrepreneur in a firm's internationalisation process, Andersson (2000) emphasised the limited importance of analysing a firm and the factors associated with that firm's internationalisation process if entrepreneurs at the firm are not included in the analysis. While acknowledging that the dominant views in international business research provide insight into the complex phenomenon of the internationalisation of the firm, he argued that an understanding of various international behaviours in the firm's first international ventures as well as of radical strategic changes is enhanced by an analysis focusing on entrepreneurs. Thus, following Andersson's (2000) assertion, the remainder

of this section will concentrate attention on entrepreneur-related factors which have been recognised as influencing the internationalisation of firms.

Entrepreneur as a Resource Co-ordinator and Network Actor

Hite and Hesterly (2001) assert that the analysis of a firm's egocentric network implies a dual level of analysis in the simultaneity of the entrepreneur's network and a firm's network. They argue that individual differences between entrepreneurs in forming network connections, acting in the role of resource co-ordinators and agents for a firm, usually influence the emergence of a firm's network. This is also emphasised by Madsen and Servais (1997) who claim that the participation of the entrepreneur in a social/business network enhances the early internationalisation of firms.

Characteristics and Perceptions of the Entrepreneurial Decision Maker

Drawing from Oviatt and McDougall's (1994; 1995) earlier works, the prior experiences of the founders, in particular, in international environments, and the entrepreneur's perceptions of risks and opportunities as determinants of the decision to internationalise a new venture's operation at inception can be identified among the major sources of competitive advantages for INVs.

There are several characteristics of the entrepreneur that previous research has shown to relate to smaller firms' international expansion of operations, such as: technical skills, business competence, and planning orientation (Bilkey and Tesar, 1977); foreign language ability, and overseas

education (Jones, 2001; Knowles et al., 2006; Zuchella et al., 2007); overseas work experience (Bloodgood et al., 1996; McDougall et al., 2003); a vision for global strategy and extensive international experience (Andersson and Wictor, 2003); geocentric/global mindset (Knight and Cavusgil, 2004); and knowledge transfer from abroad by returning entrepreneurs in high-technology industries (Filatotchev et al., 2009). Because of the importance of the entrepreneur as a key decision-maker in smaller firms, personal-level variables have to be included in this study in order to capture individual behavioural influences on the internationalisation of firms. Thus, the following is hypothesised:

Hypothesis 14a: *The age of the entrepreneur of a firm is positively associated with the likelihood of its internationalisation.*

Hypothesis 14b: *The education of the entrepreneur of a firm is positively associated with the likelihood of its internationalisation.*

Hypothesis 14c: *The experience of the entrepreneur of a firm is positively associated with the likelihood of its internationalisation.*

Hypothesis 14d: *The language skills of the entrepreneur of a firm are positively associated with the likelihood of its internationalisation.*

Summary of the Hypotheses of the Study

Table 3.3 gives a summary of the hypotheses developed to empirically test the theoretical framework discussed in previous sections.

Table 3.3: Summary of Hypotheses of the Study

Dimensions of Analysis	Hypotheses
Contextual Dimension	H1: The institutional connectedness of a firm is positively associated with the likelihood of its internationalisation.
	H2: The geographical concentration of firms is positively associated with the likelihood of the internationalisation of a firm.
	H3: The perceived external constraints for international operations by a firm are negatively associated with the likelihood of its internationalisation.
Network Dimension	H4: The participation of a firm in business networks is positively associated with the likelihood of its internationalisation.
	H5: The collaboration of a firm with foreign partners is positively associated with the likelihood of its internationalisation.
	H6a: Trust in partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.
	H6b: Commitment of partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.
	H6c: Capabilities of partners in the business networks it belongs to are positively associated with the likelihood of the internationalisation of a firm.
	H7: Interdependence between partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.
	H8: The existence of governance mechanisms in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.
Organisational Dimension	H9: The size of a firm is positively associated with the likelihood of its internationalisation.
	H10: The networking competences of a firm are positively associated with the likelihood of its internationalisation.
	H11: The technological capabilities of a firm are positively associated with the likelihood of its internationalisation.
	H12: The international entrepreneurial orientation of a firm is positively associated with the likelihood of its internationalisation.
	H13: The lack of international experiential knowledge of a firm is negatively associated with the likelihood of its internationalisation.
Entrepreneur	H14a: The age of the entrepreneur of a firm is positively associated with the likelihood of its internationalisation.
	H14b: The education of the entrepreneur of a firm is positively associated with the likelihood of its internationalisation.
	H14c: The experience of the entrepreneur of a firm is positively associated with the likelihood of its internationalisation.
	H14d: The language skills of the entrepreneur of a firm are positively associated with the likelihood of its internationalisation.

3.5 Concluding Remarks

The review of the extant literature of behavioural perspectives on internationalisation carried out in this chapter leads to three major conclusions. First, although export development studies form a substantial part of the general internationalisation literature and may offer an important contribution to the understanding of determinant factors which influence firms' behaviours and strategies when entering international markets, they seem inappropriate to explain increasingly complex forms of firms' internationalisation. The reasons for this evaluation are: (1) the reliance on a single mode of international market entry – exports; (2) the lack of consideration of other forms of internationalisation, such as inward operations, offshore services outsourcing (Di Gregorio et al., 2009), or even a de-internationalisation or market contraction (Fletcher, 2001; Agndal and Chetty, 2007); and (3) the assumption of a staged process, excluding the consideration of the firms' early internationalisation phenomenon (Jones, 1999).

Second, it appears that there are overlapping and rather complementary theories and concepts that can be reconciled in the study of firms' internationalisation. Researchers such as Bell and Young (1998), Coviello and McAulay (1999), Andersson (2000), Jones and Coviello (2005), and Spence and Crick (2006) suggest the discussion of competing explanations in a holistic sense, in order to arrive at a summary of the key issues that encompass firms' internationalisation processes. For example, integrative efforts have been made in recent studies in order to combine: (1) the experiential learning of the process-based and network-based models of

internationalisation (Johanson and Vahlne, 2003); (2) network approaches, international entrepreneurship, RBV, and a contingency view (Crick and Spence, 2005); and (3) network approaches and resource-based approaches (Loane and Bell, 2006).

Third, evaluating several streams of research with behavioural perspectives on internationalisation, the ample support for the view that network connections represent an important component in the international expansion of firms can be noted as a point of convergence emerging from several studies (Coviello and Munro, 1997; Jones, 1999; Chetty and Holm, 2000; Crick and Spence, 2005; Spence and Crick, 2006). Thus, the network approach is adopted in this study both as the overriding logic and the main analytical tool to explain the simultaneous linkages among relevant internal and external factors, which are likely to influence the internationalisation of firms, identified through the review of the existing literature discussed in this chapter. From the discussions carried out it is therefore demonstrated that the network approach provides the necessary foundations for an integrative and holistic view of firms' internationalisation processes which involves both inward and outward patterns of international involvement.

The conceptual framework and the hypotheses outlined in this chapter are intended to improve the understanding and explanation of the internationalisation of software firms in Brazil. Explanatory variables were incorporated into an integrative theoretical framework, combining concepts and theories from different behavioural schools. By doing this, the importance of both external and internal firm variables is acknowledged, providing a possible bridge between micro- and macro-level explanatory

factors, which is consistent with suggestions made by scholars in research on internationalisation (Coviello and McAuley, 1999; Spence and Crick, 2006).

Such an integrated framework needs to be empirically tested in order to demonstrate its relative advantages compared to specific domains on their own. It is believed that merging insights from the theories outlined in each of the theoretical dimensions discussed in this chapter can help to explain the internationalisation of Brazilian software firms. The next chapter outlines the methodology adopted for this study.

Chapter 4: Methodology

4.1 Introduction

This Chapter presents the research methodology for the implementation of the empirical part of this study. The presentation of the research philosophy in Section 4.2 provides a brief discussion of philosophical perspectives on the basis of which the research approach was chosen. This is followed in Section 4.3 by a discussion of the rationale for the selection of a quantitative method to answer the research questions and to collect primary data with which to test the integrative theoretical framework and hypotheses developed in Chapter 3.

Section 4.4 describes the survey method as the research strategy chosen, while Section 4.5 presents the research tactics, giving a detailed account of decisions about the questionnaire instrument for research, as well as of sampling and data collection aspects. The operationalisation and measurement of the variables included in the theoretical framework are presented in Section 4.6, which also gives an explanation of the way the reliability of the theoretically derived groupings of variables belonging to the nineteen constructs of the study was assessed.

The analytical techniques employed for data analysis are then discussed in Section 4.7. In Section 4.8, basic characteristics of the sample companies as well as participants are identified using the empirical data

obtained in this investigation. Finally, concluding remarks are presented in Section 4.9.

4.2 Research Philosophy

In undertaking a research project, philosophical perspectives influence the research design, the methodology, and the interpretation of data of a particular phenomenon (Wilson and Natale, 2001; Amaratunga et al., 2002). Thus, the aim of this section is to situate briefly the methodological choices of this study within distinct philosophical perspectives on research, so that the appropriateness of the selected research design, which guides the collection, analysis, and interpretation of the empirical data in this investigation, can be understood. Philosophical perspectives can be grouped into three main schools of thought: the positivist; the phenomenological; and the realist (Smith, 1998; Abercrombie et al., 2000; Stiles, 2003).

Positivist Perspectives

Positivist perspectives are usually associated with quantitative research methods such as sample surveys and controlled experiments (Perry et al., 1999; Healy and Perry, 2000). Essentially, positivists assume that reality is apprehensible and objective knowledge attainable, with independent facts being measured in a value-free process by the researcher (Healy and Perry, 2000). Thus, positivist perspectives assume the independence of the researcher from the subject being observed. As a worldview that can guide the researcher's understanding of social science phenomena, positivist perspectives therefore reflect notions based on the

ontology of an objective reality, restricted to the observable, and on explanatory accounts of a phenomenon based on causal links drawn from empirical regularities.

Phenomenological Perspectives

At the other extreme of philosophical perspectives on social research, phenomenological perspectives operate within the assumption that people actively construct their social world rather than having it imposed upon them. Phenomenologist Schütz (1932/1967), cited in Smith (1998), argued that the social world is intersubjectively constructed by actors who possess free will and who can and will behave in spontaneous ways not anticipated by the “fictitious consciousness” of scientists who employ the same procedures of typification as actors in everyday life. Because of their premises, phenomenological perspectives tend to rely on qualitative, grounded theory methods and interpretive methodologies in data collection and interpretation.

Realist Perspectives

In contrast to the aforementioned perspectives, the realist analysis of social life seeks to overcome the dual vision of structure and agency that one-sided perspectives have created. Realist perspectives have been acknowledged by some researchers of business phenomena as a middle-ground view of the world (Perry et al, 1999; Stiles, 2003). While they accept that people’s understanding of the social world affects their behaviour, as phenomenologist perspectives on research argue, they contend that perception is not reality. Realists consider the perceptions and meanings of

participants as only a window on to reality through which a picture of reality can be triangulated with other perceptions. As such, a deductive approach through the use of theoretical frameworks to guide and explain observations from the social world is necessary to determine the influence of underlying mechanisms on people's behaviour (Stiles, 2003).

Olsen (2001), drawing upon Sayer's (1992; 2000) complex realist ontology of social life, and Smith (1998) point out that critical realism takes seriously the existence of "reality" and the role of knowledge in understanding it as part of social scientific practice. Claiming that the methodological closure found in survey research methods should not presume a closure in reality for explanatory significance, Olsen and Morgan (2004, p. 15) contest the view that a quantitative method implies a positivist perspective of the world. They argue that methodological closure can be assumed without assuming closure in reality, and that results obtained through analytical statistics could be counter-phenomenal or unexpected, being able to contribute to a qualitative understanding.

Moreover, realist researchers assert that the knowledge obtained through discovery of the observable and non-observable structures and mechanisms that underlie events and experiences is real but still has to be considered fallible (Perry et al., 1999; Cruickshank, 2007). A summary of the main philosophical perspectives on social research examined in this study can be seen in Table 4.1.

Table 4.1: Philosophical Perspectives on Social Research

Philosophical Framework	Positivist Perspectives	Critical Realist Perspectives	Phenomenological Perspectives
Emphasis	Epistemology. Naïve realism. Reality is real and apprehensible. Objective reality. Things can be studied as hard facts.	Ontology. Objective reality. Reality is “real” but only imperfectly and probabilistically apprehensible.	Conjoining of ontology and epistemology. Multiple local and socially “constructed” realities.
Scientific Search	Empirical regularities, which are necessary and sufficient for establishing a causal law. Hypothesis testing.	To develop a family of answers that covers several contingent contexts. Complex cause-and-effect links grounded in the context of a situation.	Empirical regularities between variables are necessary but not sufficient for establishing a causal law. Hypothesis generation.
Approach to Knowledge	Closed system of a scientific experiment as a model for knowledge production.	Open systems are a defining feature of both the natural and social sciences. Knowledge is partial or incomplete.	Importance of interpretation in generating knowledge. Knowledge, like the self, comes from human experience; is a work in progress.
Facts/values	Facts are scientific and can be empirically tested. Values cannot be observed, measured or explained.	Focus on meanings.	The participant’s view is taken as “fact”.
Purpose of Research	To construct a set of theoretical statements which are generalisable and service the development of universal knowledge.	To explain observations from the social world through the use of theoretical frameworks in order to determine the underlying mechanisms that influence people’s actions.	To seek understanding of meaningful human actions. To enlarge and deepen understanding of the range of immediate experiences.
Research Design	Quantitative methodologies and analytical statistical analysis	Use of multiple methods to establish different views of the phenomena.	Qualitative, grounded theory method and interpretive methodologies. Observation, in-depth interviews, and case studies.
Theoretical Approach	Hypothetical/deductive. Data are theory driven.	Triangulation/mixed methods. Inductive/deductive. Theory used to explain observations from social world.	Inductive .Theory develops from observation.
Primary Data Collection Techniques	Controlled experiments and sample surveys	Inclusion of more deductive methods such as supporting questionnaires and extant research.	Researcher is the main instrument of data collection.
Role of the Researcher	Independence of the researcher from the subject being observed. The researcher is value-free.	To try to understand what is happening. The researcher is value-aware.	To read the participants narratives and to integrate the resulting themes into a rich description that offers an explanation of the phenomenon under study. The researcher is value-laden.
Main Criticisms	Provide only narrow unrealistic information using measures that capture only a small proportion of the phenomenon under study.	Difficulties in meeting the realist perspective’s requirements for operationalisation in which it must aim to measure objects that are meaningful to the agents whose reality the researcher wishes to explain.	Less precision, rigour, or credibility. Distortions imposed by the values and purposes of the researcher. Difficult to aggregate data and make systematic comparisons. Harder to control the pace, progress, and end-points of research process.
Main Advantages	Objective and can be measured. Results can be reduced and interpreted synthetically. Provide wide coverage of the range of situations.	It provides an element of unification by offering a philosophical “bridge” between the positivist and the phenomenologist view.	Greater richness, depth, details, and allow the researcher to discover the basis for new ideas and theories. More flexibility to adjust to new issues and ideas.

Based on Firestone (1987), Smith (1998), Perry et al. (1999), Healy and Perry (2000), Stiles (2003), Budd (2005), and Goulding (2005)

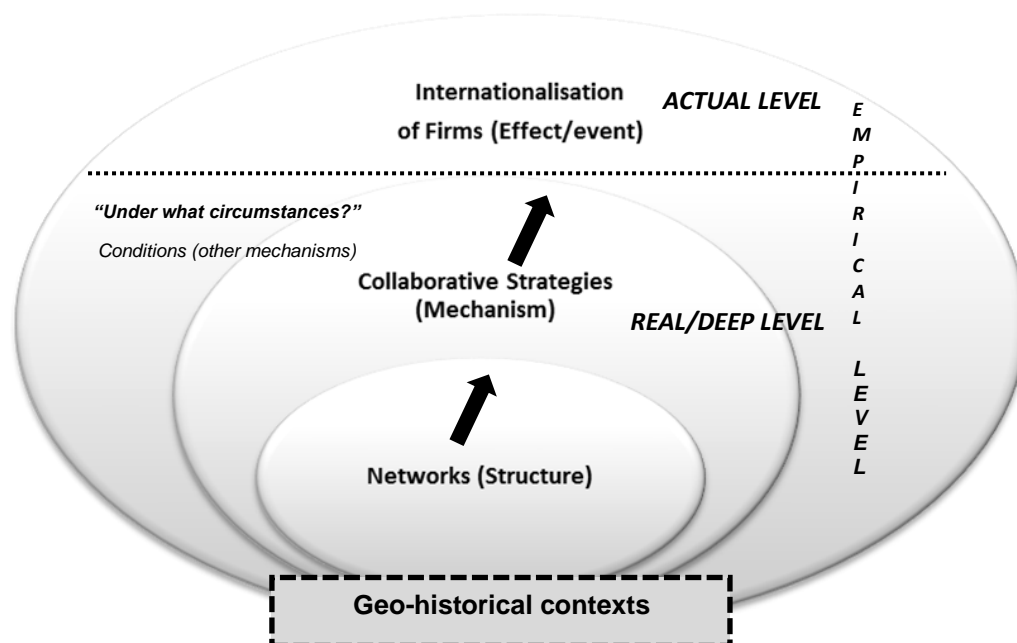
4.3 Research Approach and Method

Following the discussion of philosophical perspectives highlighted in Section 4.2, it is argued that the realist perspective represents the most appropriate philosophical foundation from which to develop the specific method of enquiry for this empirical investigation. First, the researcher acknowledges ontological limits to analytical statistical methods. Following the realist view argued by Olsen and Morgan (2004), it is assumed in this study that the characteristic methodological closure and empirical regularities sought in quantitative methods do not necessarily mean assuming real closure of social systems. Second, quantitative methods and statistical manipulation adopted by the researcher may allow the development of new qualitative understandings. Third, this study assumes that motives and values, and also, social and cultural conditions, enable researchers to generate new insights and understandings of the phenomena they study.

Moreover, recognising the inherent complexity of the world, the realist perspective challenges the one-sided nature of both the inductive and deductive research approaches to scientific explanation. Therefore, this researcher subscribes to the realist view proposed by Potter (2003), Olsen and Morgan (2004), and Juma'h (2006), who argue that scientific explanation is context-laden and occurs through an iterative multi-staged process in which the researcher, starting from her/his own frame of meaning, examines the data, manipulates it in order to operationalise concepts, revisits prior theoretical frameworks, makes comparisons to the literature, and so on.

This study thus will be grounded in the epistemology of critical realism, for both examining and explaining the interacting structures, processes and mechanisms, as shown in Figure 4.1, from which the internationalisation processes of firms may arise.

Figure 4.1: Critical Realist View and Ontological Levels Applied to this Study



Source: Smith (1998) and Sayer (2000)

A Quantitative Approach

On the basis of the previous sections and within the theoretical review in Chapter 3, it was decided that a quantitative explanatory approach was desirable to this study for a number of reasons.

First, the research objectives and type of research questions posed (see Chapter 1) require a methodology that allows for careful descriptions of patterns of associations and empirical generalisations, which in turn demand quantifiable data and an adequate amount of responses for statistical testing.

Second, when combined with a comprehensive review of the existing literature from which a theoretical framework is derived, which is the case of the present study, quantitative studies are very useful in determining directions of relationships (Amaratunga et al., 2002; Stiles, 2003). Third, since the phenomenon is well known, a quantitative approach to this study should provide a complement to rich descriptive and exploratory data provided in prior internationalisation studies emphasising the potential influence of network relationships, which mainly adopted the case study method (Coviello and Munro, 1995; Coviello and Munro, 1997; Sopas, 2000; Andersson, 2002; Chetty and Eriksson, 2002; Veludo et al., 2004; Halinen and Törnroos, 2005). Therefore, by adopting a quantitative approach, with the individual firm being examined as the unit of analysis, this researcher is enabled not only to describe but also to compare, to relate one characteristic to another, and to demonstrate that certain features exist in certain categories of firms.

4.4 Research Strategy

Having recognised important issues that need to be considered when deciding research methods, the survey method through a self-administered mail questionnaire for data collection was chosen as this study's main research strategy for the following reasons:

- (1) The comprehensive nature of the objectives of this research - to gain an understanding of the phenomenon at national level – is best suited to be explored through extensive research such as a survey examination;

- (2) The logistical and operational challenges of managing a nationwide research study in a country of huge size such as Brazil makes it almost impossible for a single researcher to collect empirical data of sufficient size and scope from a sample of firms spread across the country by conducting personal or telephone interviews, due to time and resource constraints;
- (3) The technical background and high educational level of professionals found within the software industry in Brazil (Ministério da Ciência e Tecnologia, 2001), make them suited to more specialised studies and more likely to identify with the goals of the study and to fill out a self-administered questionnaire (Frankfort-Nachmias and Nachmias, 1996);
- (4) The survey method allows the researcher to confirm or refute the generalizability of previous findings in network research, following Scandura and Williams' (2000) recommendation that researchers should consider designs which are complementary to the ones usually adopted in their fields.

The explanation above follows Frankfort-Nachmias's and Nachmias's (1996), Zikmund's (1997) and Gunawan et al.'s (2004) line of reasoning, as they argue that the survey method makes possible a higher number of respondents to be surveyed within a shorter timeframe. Therefore, the choice of the survey method through a self-administered mail questionnaire assured methodological consistency and feasibility for this research project.

The choice of the survey method is also supported by ontological reasoning. In a paper that analyses and reviews the emerging network

paradigm in organisational research, Borgatti and Foster (2003) indicate that “ego-network¹⁵ studies blend a network-theoretic perspective with conventional, individual-oriented methods of collecting and processing data” (p. 992). The authors suggest that when a single focal actor is the focus of attention, which is the case in this study, data can be collected for unrelated egos as in a random sample of a large population.

Nevertheless, the researcher is aware of, and has consciously attempted to address, some of the main limitations of mail surveys during the research process: (1) the possibility of misunderstandings and unanswered questions; (2) the information obtained may be insufficient to understand complex processes; (3) a low response rate may limit the generalizability of the findings; (4) self-selection bias: the responders may be more interested, involved, and/or experienced than non-responders; and (5) the difficulty of finding the right respondent: top executives and firms' postal addresses may change; some other person may fill in the survey instead of the desired respondent.

The Research Setting

A Brazilian setting was considered a suitable ground for a study concerned with the impact of business network relationships on the internationalisation of software firms for several reasons. Firstly, because of the country's increasing importance as one of the leading recipients of foreign direct investment (FDI) in Latin America and the Caribbean Region as well as its strongest outward FDI position in Latin America (UNCTAD,

¹⁵The term ego-network can be defined as the ensemble of ego, his alters, and all ties among these, including those to ego (Borgatti and Foster, 2003, p.992).

2005; 2006; 2010). Secondly, the inflow of software product and service companies since the advent of trade-liberalisation in the country has made the IT sector one of the top three destination sectors for foreign direct investment in Brazil (Botelho et al., 2005), stimulating the increased participation of indigenous software and services companies in the global economy in the last decades.

In this context, the need to understand the factors affecting software firm's internationalisation is particularly important in the case of emerging economies with a large domestic market, such as Brazil. Such understanding is crucial for the design of appropriate measures with which to assist smaller firms, which usually face greater constraints in developing countries to access international market segments than do larger firms (Nichter and Goldmark, 2009). Finally, being a native Brazilian the researcher could take advantage of her familiarity with the country context which would help in gaining access to valuable information sources.

4.5 Research Tactics

4.5.1 Sampling Process and Sample Design

It has to be stressed that when data collection began for this research, no publicly available national database of either SMEs or software firms existed in Brazil, leading the researcher to define the target population of indigenous software companies of all sizes on which to base the study. As SMEs constitute 98 percent of all enterprises in Brazil (Sebrae, 2006) and also 98 percent of all Brazilian software companies (Botelho et al., 2005), a reliable database should ideally follow this pattern of size distribution of firms

in the country. As stated in Chapter 2, because of the lack of consensus on the actual number of software firms in Brazil, this study uses a nonprobability sample¹⁶ from which a convenience-sampling approach was taken. Also, given the limitations of internationalisation data in Brazil, and as there are no published sources on international Brazilian software and services firms, a sample was drawn from a variety of sources, based upon four selection criteria:

- (1) The firm had to be an indigenous company;
- (2) The firm had to be privately-owned;
- (3) The firm's activities had to comprise either the development or distribution of software products or services; and
- (4) The firm had to have at least one employee – to exclude from the sample self-employed professionals who set up a firm just for the purpose of being contracted by larger firms.

During the process of defining the sampling frame for this study, the researcher gained access to three distinct secondary sources (the National Social Security Institute – INSS – database; the Annual Report on Social Information - RAIS/General Registry of Employed and Unemployed People - CAGED database; and the Ministry of Science and Technology – MCT – database) and evaluated each of them in regard to their appropriateness for the objectives of this study (see Table 4.2).

¹⁶According to Frankfort-Nachmias and Nachmias (1996, p. 184) social scientists use nonprobability samples “when a sampling population cannot be precisely defined or when a list of sampling population is unavailable.”

Table 4.2: Assessment of Sources for the Establishment of Sampling Frame

Database	Elements Assessed	Decision
INSS ¹⁷ database	<ul style="list-style-type: none">• More than 7,500 firms developing activities related to information technology sectors.• It was not possible to identify firms within the software and allied services sector accurately.	<ul style="list-style-type: none">• Rejected
RAIS ¹⁸ /CAGED ¹⁹ database	<ul style="list-style-type: none">• Directory providing reliable information on all companies, arranged according to sector of activity, included in the Federal Government national pension system.• According to industry experts, the database of 6,559 software development firms (CNAE's²⁰ code 6201-5) did not differentiate between SMEs and self-employed entrepreneurs that establish firms only for legal outsourcing arrangements.	<ul style="list-style-type: none">• Rejected
Ministry of Science and Technology (MCT) database	<ul style="list-style-type: none">• A national dataset of software companies in Brazil compiled and maintained by the Ministry of Science and Technology (MCT).• Updated information on companies of all sizes and regions which took part in the latest edition of the MCT study "Quality and Productivity in the Brazilian Software Sector", carried out in 1993, 1995, 1997, 1999, 2001, and 2005.	<ul style="list-style-type: none">• Accepted

As shown in Table 4.2, the assessment of the three databases aforementioned led to the selection of the MCT list as one of the sources for the sampling frame for this investigation because of its level of accuracy, comprehensiveness, and appropriateness for this study.

An additional effort to get a comprehensive sampling frame was made by the researcher who contacted several software associations and national-level authorities that maintain directories and contact lists of software firms, and by searching various regional/national SME databases and directories of software and allied services firms.

On 21st August 2005, the sampling frame was completed in a database comprising 1,369 companies taken from: (1) the MCT database;

¹⁷INSS (National Social Security Institute)

¹⁸RAIS (Annual Report on Social Information, of the Ministry of Labour)

¹⁹CAGED (General Registry of Employed and Unemployed People, of the Ministry of Labour)

²⁰CNAE (The National Classification of Economic Activities - CNAE is the classification officially used in Brazil by the National Statistics System in the production of statistics and in the identification of economic activity in registers of legal entities)

(2) lists of companies taking part in the Brazilian Support Service for Micro and Small Enterprises – SEBRAE - support programmes supplied by most of the 27 State branches of the organisation; (3) the Society for the Promotion of Excellence in Brazilian Software – Softex lists; and (4) lists of companies taking part in conferences and exhibitions.

A total of 1,213 firms remained in the sampling frame, after excluding duplicated and incomplete addresses, and companies characterised as foreign multinationals, state-owned, university foundations, and public companies which would not represent the population of the study. All in all, this process involved about six months of part-time work. To the best of our knowledge, this study constitutes to date the most comprehensive empirical investigation of the internationalisation of firms in the software and allied services industry in Brazil.

Key-Informant Approach

According to Frankfort-Nachmias and Nachmias (1996, p. 230), the nature of the study and the characteristics of the population are important factors in the selection of potential respondents. The authors assert that researchers need to consider carefully the desirable characteristics because interest and familiarity with the phenomenon under investigation are likely to influence the response rate.

Campbell (1955) claimed that the key informant should be chosen because of his/her special qualities within the organisation. Similarly, Cowles et al. (2002) suggest that key informants should be selected on the basis of two criteria: (1) they should occupy roles that make them knowledgeable

about the issues being researched; and (2) they should be able and willing to communicate with the researcher. Also, some empirical studies of SMEs' internationalisation indicate that collecting information from members other than the main decision-makers of such organisations adds little depth of knowledge to address the research questions (Spence and Crick, 2006). Given the focus of this study on Brazilian software firms, the majority of them of micro and small size (see Chapter 2), it was decided that the key-informant approach would be appropriate for data collection.

Thus, entrepreneurs, as decision-makers playing a crucial role in relation to strategic decisions and direction of SMEs, were targeted as the major sources for providing appropriate information by answering the research questionnaire.

4.5.2 The Design of the Questionnaire

The research questionnaire was designed over a period of one year, in 2004, following the review of the literature. Careful attention was given to several issues related to the degree of appropriateness of the survey instrument to the profile of targeted firms and respondents, as well as to the factors influencing mail-survey responses (Harzing, 1997). In particular, guidelines for questionnaire construction and survey implementation, adapted from the Total Design Method (TDM), a standardised set of step-by-step procedures, were considered (Frankfort-Nachmias and Nachmias, 1996; Erdogan and Baker, 2002). The strategies that the researcher adopted in this study to overcome the difficulties affecting the response rate of mail questionnaires are presented in the next sections.

Sponsorship

This has a significant effect on respondents, often motivating them to fill in questionnaires. The support of three institutions, with their respective logos, was acknowledged in the cover letter and on the front page of the study questionnaire: (1) the Brazilian Support Service for Micro and Small Enterprises (SEBRAE); (2) the University of Bradford School of Management in the United Kingdom; and (3) the Society for the Promotion of Excellence in Brazilian Software – SOFTEX (see Appendices A and B). The decision to disclose the support of these institutions was made because it was believed to demonstrate to the firms the reliability and credibility of the research project.

Each of the three institutions was believed to enhance the perceptions of potential participating firms in distinct ways. The support of the Softex Society was made explicit because of its work for the promotion of software exports and other nationwide initiatives in Brazil. Sebrae's support was disclosed because of its well known advocacy work and its provision of support services to SME companies in all Brazilian states. Finally, the support of The University of Bradford School of Management was declared because it would demonstrate the non-commercial and academic purpose of the study. Therefore, because of these distinct and complementary roles, the support of these three institutions was declared.

Inducement to Respond

Researchers can appeal to the respondents and persuade them to fill out the questionnaires and send them back by appealing to their goodwill, or

convincing them of the significance of the study, or offering an incentive, such as a prize. After assessing distinct inducement measures and asking pilot- study respondents about what type of incentives would appeal to executives of companies in the software and allied services industry, an incentive to encourage participation in this research project was decided on.

As a thank-you for completing and returning the questionnaire before 16th December 2005, the chance of a free annual subscription to The Harvard Business Review in Portuguese was promised in the cover letter (see Appendices A and B). The incentive did not necessitate any kind of expenditure on the part of respondents. The winner was determined by a random draw from all eligible entries, which was held on 17th December 2005, according to the four numbers of the 1st. Prize of the Federal Lottery in Brazil.

The researcher herself administered the free prize draw incentive. As soon as each completed questionnaire was returned the company's respondent was notified by e-mail of his/her random number. Immediately after the prize draw, the researcher contacted the individual respondent of the winner company by telephone in order to make the necessary arrangements for the delivery of the free prize. No postage or any other kind of cost was incurred by the winner. Also, all survey participants were informed by e-mail of the prize draw winning number and the corresponding winner of the prize.

The Study Webpage

In order to boost further the credibility of the study to the targeted companies, and to increase the response rate, a webpage was especially designed by the author (see Appendix C) to provide accessible information about the researcher's background, the objectives of the study, useful links, access to online papers on the research topic, and institutional support received from industry associations such as Softex and Sebrae, the Brazilian support agency where the researcher works. The online address of the webpage had a professional look and also contained an electronic version of the questionnaire available for download.

On the front page of both the cover letter and the questionnaire, respondents were stimulated to visit the study webpage available on the Internet at the address: <http://www.sebrae.com.br/br/pesquisasw/index.asp>. Also, in the cover letter a special e-mail address was made available (pesquisasw@sebrae.com.br) to participating firms for the clarification of any specific issues related to the study. These electronic tools proved to be very useful during the data collection stage, improving communications. A copy of the research webpage can be seen in Appendix A.

Questionnaire Format

Erdogan and Baker (2002, p. 68) and Shaw et al. (2002) argue that initial impressions of respondents influence their co-operation, and the appearance of the questionnaire frequently influences whether the instrument is read or discarded. A marketing design approach was thus incorporated into the format of the questionnaire in order to maximize

respondent-friendliness and its attractiveness to prospective respondents. The researcher sought the professional advice of a corporate-communications graphic designer to implement design features such as desirable item-spacing, colour choices, and several other layout features, bearing in mind the need to keep the professional look of the instrument. It was also decided to use a blue high-quality paper as it could help the questionnaire to look distinctive and stand out from the crowd of office mail.

Besides the careful consideration of its sections and contents, the front page of the eight-page questionnaire was especially aimed at stimulating participation. The inclusion of relevant information on the front page such as the study objectives, target respondents, the anonymity and confidentiality of responses, and the institutional support received by the researcher were the aspects covered in this area of the instrument. Also, the reminder that no answers should be left blank was given.

Questionnaires were single sheets, and thus did not require binding; folding and trimming were done by a professional printing company. The outlook and graphical design of the questionnaire in its final version (English and Portuguese) can be seen in Appendices C and E at the end of this thesis.

Cover Letter

The cover letter must convince the respondents to fill out the questionnaire and mail it back (Frankfort-Nachmias and Nachmias, 1996, p. 228). With this requirement in mind, the cover letter was written to explain the purpose of the survey and the importance of its return, and to validate the

reason for selecting that individual. It matched the similar attractive design of the research questionnaire, with the same paper colour and overall style (see Appendices A and B). The letter, with a scanned image of the researcher's hand-written signature, identified the logos of sponsors of the study and explained its purpose and importance. As previously discussed, a free prize-draw incentive of an annual subscription to The Harvard Business Review in Portuguese was promised to companies returning the questionnaire up to 16th December 2005. Furthermore, mention of the inclusion of a stamped, self-addressed return envelope, contact e-mail, and study webpage were provided, and the confidentiality of all responses was assured by the researcher.

Personal Approach

According to Harzing (1997), the feeling of being addressed personally can increase response rates of mail surveys. Thus, on the outside of good-quality plain white envelopes there were typed on a white sticker the company name, its full address, and the prospective respondent's name - mostly company owners or executives' names. This personalised survey package was included in the majority of mail packages where this information was available from the lists included in the sampling frame.

Questionnaire Content

The items chosen for this study's questionnaire were formulated on the basis of the results from SME internationalisation studies, with particular attention to qualitative network-based studies. The survey questionnaire

comprised closed-ended questions in seven sections, covering the following aspects: a) general information about the company; b) strategy, internationalisation and collaboration; c) participation in business networks; d) context, structure and performance of the company; e) mechanisms of access, co-ordination and governance; f) entrepreneurial orientation and the management of the company; and g) information about the respondent. Several questions comprised multiple items measured at the ordinal level using five-point Likert scales.

Because of fatigue and other undesirable problems such as response - order effects in self-administered questionnaires, careful attention was given to the order of the items and to the intended meaning in each of the questions (Schwarz and Oyserman, 2001).

Instrument Reliability and Validity

The draft questionnaire was sent then to thirteen knowledgeable specialists, either from the software industry or academia, both in Brazil and abroad, during the period between October and November 2004. The aim was to assess the content validity of the questionnaire. Ten specialists returned their feedback to the researcher. After consideration of each feedback, several modifications were made in language, concept clarification, layout and conciseness, during the period of consultation, in order to improve the instrument designed.

Back-Translation Procedure

Following best methodological practices (McGorry, 2000), a back-translation procedure, also called double translation, was adopted for the design of the questionnaire, which was written originally in English by the author and was administered in Portuguese. The original English version was translated by a native Portuguese/speaker professional with non-academic background. The Portuguese version was then back-translated by a native English-speaking professional with academic background. After detecting some wording problems, minor changes were made and the two versions of the questionnaires were regarded as equivalent.

Type of Mailing

The mailing package was prepared following known best-practice for such mailings. For example, it is commonly held that C4 envelopes are used for important letters that should not be folded. Thus a white plain C4 envelope, with a typed address on a white sticker and the researcher's name and address printed on its back, contained the printed cover letter, the research questionnaire, and a pre-paid return envelope.

To ensure that undeliverable questionnaires were automatically returned to the researcher, an official contract was made with The Brazilian Mail and Telegraph Company (ECT), the Brazilian Post Office. The procedure was aimed at allowing the researcher to clean up the sampling frame and to try to tackle some of the problems which are reported to occur in mailing lists used to conduct research-project surveys, such as wrongly named respondents, companies that have moved to a new location or closed

down, and incomplete addresses (Braunsberger et al., 2005). Therefore, this was considered a strategy that would permit the researcher to minimize problems that might affect the response rate for this study.

4.5.3 Pilot Study: Pre-test of the Questionnaire

Conducting a pilot study is a necessary step to foresee misunderstandings or the biasing effects of questions and procedures of a survey questionnaire (Thomas, 2004). Thus, after the content-validity phase, a pilot study was conducted by site visits during the period 10th to 14th January 2005 to test the research questionnaire in its intended graphical layout. In this phase, the researcher carried out face-to-face interviews with nine entrepreneurs and one executive of ten software companies of various sizes located in Brasília, the capital of Brazil.

Besides the fact of being the city where the researcher lives, the main criterion for the choice of interviewing firms located in Brasília is that the city has today one of the largest agglomerations of software firms in the Centre-West Region, justifying it as an acceptable option for the implementation of this exploratory stage. Careful consideration was given to the selection of a diversified group of enterprises in terms of size and age, among other factors that could bias the pilot study.

The researcher received the support of Tecsoft, the Society for the Promotion of Excellence in Brazilian Software – SOFTEX's agent in the Federal District – to identify key informants of software companies which would be representative of the target population. The researcher then telephoned all potential respondents, who showed great willingness to

participate, and obtained the agreement of ten companies to take part in the pilot study, as Table 4.3 shows.

Table 4.3: Overview of Pilot Study Companies

Company	Size ¹	No. of Employees	Age ²	Internationalisation		Position	Respondent	
				% of Imports ³	% of Exports ⁴		Years of Experience ⁵	Educational Level ⁶
A	MI	6	8	0	0	Owner	22	U
B	NI	70	7	0	3	Owner	12	U
C	MI	20	5	0	0	Owner	9	U
D	S	45	21	0	5	Owner	25	S
E	S	42	12	0	3	Owner	20	S
F	ME	130	11	2	0	Owner	15	P
G	MI	12	13	0	0	Owner	25	P
H	MI	13	11	2	0	Owner	30	P
I	MI	3	8	0	0	Owner	10	U
J	L	6,500	34	2	2	Executive	9	P

¹ According to company's annual revenue (2004): MI = microenterprise (Up to R\$2,000,000.00); S = small enterprise (R\$2,000,000.01 – R\$10,000,000.00); ME = medium enterprise (R\$10,000,001 – R\$50,000,000.00); L = large enterprise (Above R\$50,000,000.00); NI = not informed. ² Age: years of operation since foundation. ³ To total supplies in 2004. ⁴ To total sales in 2004. ⁵ Within the software and allied services industry. ⁶ S = Secondary education; U = Undergraduate degree; P = Postgraduate degree.

A primary objective of this pre-test was to collect data that would enable the survey instrument to be refined. Each face-to-face interview lasted between one and two hours. They were aimed at testing the questionnaire in order to identify weaknesses and potential problems and to assess three issues from the perspective of the respondents: (1) their understanding of the questions they were asked in order to identify overly ambiguous terms and complicated wordings; (2) the level of difficulty of the questions; and (3) the appropriateness of the design and layout of the questionnaire.

A briefing interview was constructed to facilitate the pilot process. Upon arrival, the researcher introduced herself and informed the respondent of the methodological nature of the study and the voluntary nature of the respondent's participation in it. Respondents were also informed of the

format that the interview would take and of the purpose of the study. In addition the respondents were informed that the answers they provided would be held in strict confidence. Respondents were informed that individuals who were to complete the instrument would receive it in the mail, and were therefore asked to answer the pilot questionnaire as if it had been received in the mail. After the questionnaire was completed, a respondent debriefing was applied with the following questions shown in Table 4.4.

Based on the findings of the pilot study, further refinements were made in the questionnaire, following the comments, suggestions and apparent difficulties reported by respondents.

Table 4.4: Debriefing Interview for Pilot Study

Questions
The Questionnaire: <ul style="list-style-type: none"> • Are the questions <ul style="list-style-type: none"> ○ Simple? ○ Easy to understand? ○ Short? ○ Relevant to your business? ▪ Is there any question(s) that asks about sensitive issue(s)? ▪ Any unanswered questions during the questionnaire completion? Why? ▪ Are the words simple/ adequate to you? ▪ Any conceptual or question-wording difficulties that were identified? ▪ Does the visual presentation of the questionnaire make your response easier?
Data Collection Strategy: <ul style="list-style-type: none"> • Given the objectives of the study, do you think a mail survey is an appropriate strategy to achieve a good response? Why?
Any other comments?

Survey Administration

The mailing package consisted of a professionally printed questionnaire, a pre-paid response envelope enclosed, and a letter

addressed to the owner/executive of the company. Bearing a possibly low response rate in mind and the relatively affordable postage costs, it was decided to do a census of all firms included in the database of this research. Consequently, the mailing package posted on 16th November 2005 went to the totality of the 1,213 firms included in the sampling frame of this study.

The findings of a research study done by Erdogan and Baker (2002) reinforced the idea that low response rates are typical of industrial mail surveys. They compared four follow-up strategies in terms of response rate and cost-effectiveness, indicating that all follow-up techniques increase response rates. They also stressed the important question of how to set the acceptable level of response rate for the initial mailing, stressing that this will differ from study to study, client to client, and industry to industry.

A preliminary notification by e-mail was sent to 1,191 firms with known electronic addresses during the period 21st to 24th November 2005. A first reminder e-mail was sent then on 6th December 2005 to 1,145 firms which did not return the questionnaire by 5th December. With the aim of increasing the response rate, a request for help from all Sebrae state branches was sent by e-mail during the period 12th to 21st December 2005. After this, a second reminder e-mail was sent to companies on 9th January 2006. Finally, phone calls were made to five companies with uncompleted questionnaires during the period 16th-17th February 2006. Table 4.5 displays the time frame for questionnaire design and administration.

Table 4.5: Time Frame for Questionnaire Design and Administration

Stage	Number of Respondents	Time
Content Validity	10 knowledgeable specialists (7 academics, 3 from the software industry), both in Brazil and abroad	October-November 2004
Pilot Study	9 entrepreneurs and 1 executive from ten software firms in the city of Brasília, Federal District, Brazil	January 2005
Final Survey	A package of professionally printed cover letter, questionnaire, and pre-paid return envelope posted to a total of 1,213 firms	16th November 2005
Preliminary Notification	Notification by e-mail to 1,191 firms with known electronic addresses	21-24 November 2005
First reminder	E-mails to 1,145 firms which did not return the questionnaire by 5 th December	6th December 2005
Second Reminder	E-mails to 1,063 firms which did not return the questionnaire by 5 th January with questionnaire attached	9th January 2006
Phone calls	5 firms with uncompleted questionnaires	16-17 February 2006
Closing Date	A total of 152 firms returned the questionnaire	24th February 2006

A total of 152 questionnaires were returned by the closing date of 24th February 2006, of which four questionnaires were disregarded. Three questionnaires were discarded because of incomplete data. The fourth questionnaire was disregarded because, after preliminary screening, it had the largest number of employees in the sample. Thus it was decided that a search for published information available on the Internet about the company would be necessary to check whether or not the company was a truly independent and indigenous Brazilian firm, one of the four selection criteria for a company to be included in this study's sample. The search carried out by the researcher revealed that the respondent company was a multinational firm. Therefore, a total of 148 completed questionnaires were considered valid to this research.

Response Rate

The response rate achieved was 12.5 percent, as shown in Table 4.6, which is acceptable given the nature of the target population, mostly firms of smaller size.

Table 4.6: Summary of the Survey Response

Sample	Number of Respondents
Total sample mailed	1,213
Received in the first wave (until 5th December 2005)	46
Received in the second wave (until 5th January 2006)	82
Received in the third wave (until 17th February 2006)	24
Total returned questionnaires	152
Response Rate	12,5%

According to Erdogan and Baker (2002), acceptable levels of response rates differ from study to study, client to client, and industry to industry. They suggest there is a need for a researcher to carry out a meta-analytical study reporting average initial response rates for different industrial populations so that he/she will not be left alone to his/her own subjective judgments, but can rely on objective criteria.

Although thorough attention was dedicated to the design of the questionnaire, the response rate achieved can be considered only moderate. There are some possible reasons for the rate achieved. First, the length of the questionnaire, and second, the fact that other recent studies, at the time of this empirical investigation, were being carried out with basically the same target population. A final constraint could be the timing of the survey since

the initial mailing and the follow-up mailings were dispatched five and three weeks prior to Christmas, respectively. The researcher was well aware of this difficulty, but had to conduct the survey in 2005 for scheduling reasons.

Description of the Study Sample and Non-Response Bias

Table 4.7 shows the investigation of non-response bias in the final study's sample of 148 firms through a comparison of some chosen aspects as between early and late respondents – the early respondents, or 'first-wave' respondents, being the 46 firms who replied without any further action by the researcher, up to 4th December 2005; and the late respondents being the 102 firms which replied after this date, when further actions, such as e-mail reminders sent to sample firms, had been carried out.

Table 4.7: Comparison between Early and Late Respondents

Categories	Early Respondents (n=46)	Late Respondents (n=102)
Years of Experience of Respondents in the industry	Mean: 17.37 SD: 6.68	Mean: 15.61 SD: 8.43
Gender of Respondents		
• Feminine	6.52%	14.85%
• Masculine	93.48%	85.15%
Age of Respondents		
• 22-30	6.52%	19.80%
• 31-40	39.13%	46.53%
• 41-50	43.48%	19.80%
• 51-60	8.70%	12.87%
• Over 60	2.17%	0.99%
Educational Level of Respondents		
• Secondary education	4.35%	3.96%
• Undergraduate degree	41.30%	43.56%
• Postgraduate degree	54.35%	52.48%
Age of Companies	Mean: 11.04 SD: 6.04	Mean: 10.58 SD: 6.75
Number of Employees	Mean: 52.85 SD: 151.82	Mean: 136.61 SD: 517.36
Company Annual Revenue		
• Up to R\$2.000.000,00	58.69%	51.97%
• R\$2.000.000,01 – R\$10.000.000,00	34.78%	32.36%
• R\$10.000.001 – R\$50.000.000,00	4.34%	8.82%
• Above R\$50.000.000,00	2.17%	6.86%
Internationalisation		
▪ Percentage of Imports to Total Supplies in 2004	Mean: 18.80 SD: 26.40	Mean: 24.95 SD: 29.45
▪ Percentage of Exports to Total Sales in 2004	Mean: 2.38 SD: 10.90	Mean: 3.31 SD: 12.45

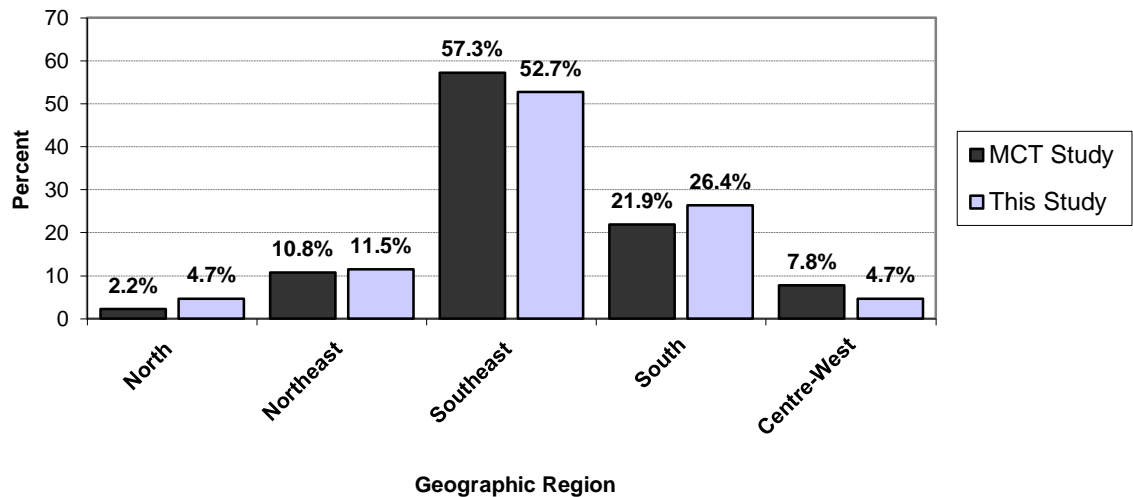
Although the percentages of age groups of respondents and number of employees of companies shown in Table 4.7 differ considerably between early and late respondent firms, we see that for most of the characteristics the figures lie close together, so it is believed non-response bias creates no significant problem in this study.

Representativeness of the Study Sample

Due to the non-probabilistic nature of the study sample it is important to establish its representativeness. Figure 4.2 shows a comparative overview of the geographic distribution of samples of surveyed software firms in Brazil,

in official studies of this sector (Ministério da Ciência e Tecnologia – MCT, 2005) and in the present study.

Figure 4.2: Comparison of Two Samples of Software Firms in Brazil



Looking at the comparison between the MCT's study and this study's sample, one can assume that the sample for this study provides a good representation of the population of software firms in Brazil (Figure 4.2). Indeed, the correlation between the number of firms in each region for the two surveys was high and statistically very significant (Spearman Rho = .85, $p < .01$). Thus, no great bias in relation to official data on the software sector available at the time of this study can be assumed.

4.6 Development, Operationalisation and Measurement of Variables

This section describes the development, operationalisation and measurement of the variables employed in this study, which were derived from previous related research, as already discussed within Chapter 3. Four distinct sets of explanatory variables were included in the integrative theoretical framework of this research in order to test the linkages among relevant internal and external factors which are likely to influence the

internationalisation of Brazilian software firms. A three step process was followed. First, drawing from the literature, several construct measures were developed or adapted on the basis of expert advice and on the pilot study phase (see Sections 4.5.2 and 4.5.3), for the context of this research.

All operational measures consisted of survey questions answered by firms' respondents. For most constructs, the questions were closed-response and measured as a composite index, calculated as weighted factor scores of responses to multi-items on a five-point likert scale provided in the questionnaire survey. Second, in order to assess the degree of internal consistency of the theoretically derived groupings of variables belonging to the constructs already defined, a diagnostic measure known as Cronbach's alpha reliability coefficient was used in a series of statistical tests. Third, confirmatory factor analysis was conducted to assess the validity and dimensionality of the scales.

4.6.1 Development and Operationalisation

Dependent Variables

According to this study's theoretical framework, the internationalisation of the firms is expressed by international engagement through (a) exports and (b) imports. Although previous internationalisation studies have argued the need to overcome the traditional adoption of single measures of a firm's internationalisation (Hadley and Wilson, 2003), and that internationalisation has performance (*what goes on overseas*), structural (*what resources are overseas*) and attitudinal (*what is top management's*

international orientation) attributes, as Sullivan (1994) suggests, it was considered adequate, for methodological purposes, to focus our attention in this study on only two performance variables, *exports* and *imports*.

Building on Sullivan's findings (1994) on foreign sales as a percentage of total sales as one of the variables that loaded most highly on a comparison of nine operationalisations of the "degree of internationalisation", *exports* was measured in the survey questionnaire as a ratio variable by the percentage of sales to foreign markets to total sales. As such, the range of value for a firm is 0.0 (absolutely no foreign sales) to 100 (absolutely total sales to foreign markets). Following the same logic, *imports* was measured in the survey questionnaire as a ratio variable by the percentage of supplies, in terms of value, from abroad. As such, the range of value for a firm is 0.0 (absolutely no supplies of foreign machinery, equipment, software, or any other type of foreign input) to 100 (absolutely total supplies of foreign inputs).

As a second stage, for logistic regression analytical purposes, imports and exports were then transformed into dummy variables where firms with a percentage of foreign sales different than 0.00 in 2005 were coded "1" (exports) and "0" otherwise and firms with a percentage of supplies from abroad different than 0.00 in 2005 were coded "1" (imports) and "0" otherwise.

It is important to stress that, as argued in Chapter 3, the adoption of the two dependent variables, *exports* and *imports*, is considered more adequate to a holistic approach to internationalisation behaviour, involving both outward and inward international activities (Bell, 1995; Bjorkman and

Kock 1997; Fletcher, 2001; Karlsen et al., 2003; ENSR - European Network for SME Research, 2003; Zhou et al., 2007).

Explanatory Variables

The development of the four sets of explanatory variables used in the theoretical framework of this study, as determinants of both *exports* and *imports* by Brazilian software firms, are discussed next in more detail. They relate to contextual, network, organisational, and entrepreneurial dimensions.

It is important to stress that most of the explanatory variables in this study were measured through perceptual measures. This approach is supported by Slangen and Hennart (2007) who assert that researchers can rely on managerial perceptions to operationalise certain constructs rather than relying exclusively on factual data. They argue that the main advantage of perceptual measures is that they make it possible, by carefully designing and formulating survey questions, to reflect theoretical constructs difficult to measure through archival data. Table 4.8 outlines the measurement of the explanatory variables.

Table 4.8: Measurement of Explanatory Variables

Variable Category	Construct/Variable	Hypotheses	Previous Research	Operational Definition and Question Number in the Questionnaire (Appendices A and B)
Contextual Dimension Variables	Institutional Connectedness	H1	Granovetter (1992), Halinen and Törnroos (1998), Fletcher and Barrett (2001)	6 items measured on a 5-point Likert-scale, Questions E.1.4 to E.1-8, E.1.15.
	Geographic Concentration of Firms	H2	Sengenberger and Pyke (1992), Porter (1998), Schmitz (1999), Pietrobelli (2002), Boschma and Ter Wal (2005)	Number of firms in the sample for every 10,000km ² of each Brazilian Federal State, Geographic location of firm obtained using data of city and state supplied in the questionnaire. Measured as dummy variables (0 and 1)
	External Constraints for International Operations	H3	Barrett and Wilkinson (1985), Cavusgil and Naor (1987), Kwon and Knopa (1993), Cavusgil and Zou (1994), Katsikeas (1994); Leonidou and Katsikeas (1996), Zou and Stan (1998), Baldauf et al. (2000), Da Silva and Da Rocha (2001), Whitelock and Jobber (2004)	16 items measured on a 5-point Likert-scale, Questions B.13.1 to B.13.16
Network Dimension Variables	Participation in Business Networks	H4	Cook and Emerson (1978), Axelsson (1992), Borgatti and Foster (2003)	2 items, measured as dummy variables (0 and 1) in Questions C.1 and C.2, used to establish the participation or not in business networks
	Collaboration with Foreign Partners	H5	Wright et al. (2002), Knight and Cavusgil (2004)	7 items measured on a 5-point Likert-scale, Question B.14
	Trust	H6a, H6b, H6c	Axelsson and Easton (1992), Granovetter (1992), Blankenburg (1995), Nakamura et al., (1997), Moller and Halinen (1999), Johnsen and Johnsen (1999), Dyer (2000), Helfert et al. (2002), Sherer (2003)	6 items measured on a 5-point Likert-scale, Questions C.12.1 to C.12.7
	Commitment		Spekman et al. (1997;), Dennis (2000), Helfert et al., (2002), Sherer (2003)	3 items measured on a 5-point Likert-scale, Questions C.12.12 to C.12.14
	Capabilities of Partners		Sherer (2003)	5 items measured on a 5-point Likert-scale, Questions C.12.15 to C.12.19
	Interdependence between Partners	H7	Easton (1992), Holmlund and Törnroos, (1997), Nassimbeni (1998), Smith and Barclay (1999), Bengtsson and Kock (2000), Overby and Min (2001), Eriksson and Chetty (2003), Chetty and Wilson (2003)	4 items measured on a 5-point Likert-scale, Questions C.5.1 to C.5.5
	Governance Mechanisms	H8	Nakamura et al. (1997), Jones et al. (1997), Jones (1999)	6 items measured on a 5-point Likert-scale, Questions E.1.10 to E.1.14
Organisational Dimension Variables	Size of Firm	H9	Calof (1993; 1994), Buckley (1993), Jones (1999), Baldauf et al. (2000)	1 item measured as ordinal variable, Question D.5
	Networking Competences	H10	Ritter (1999), Ritter et al. (2002), Ritter and Gemünden (2003)	20 items measured on a 5-point Likert-scale, Questions D.1.1 to D.1.11 and D.2.1 to D.2.9
	Technological Capabilities	H11	Kohn (1997), Lefebvre et al. (1999), Yang et al. (2004)	4 items measured: 3 as a ratio (D.6.1 to D.6.3) and 1 as an index measure (D7)
	International Entrepreneurial Orientation	H12	Stevenson and Jarillo (1990), Knight (2001), Brown et al. (2001)	23 items measured on a 5-point Likert-scale, Questions F.1.1 to F.1.23
	International Experiential Knowledge	H13	Johanson and Vahlne (1977), Eriksson et al. (1997)	6 items measured on a 5-point Likert-scale, Questions D.8.1 to D.8.6
Entrepreneur-related Dimension Variables	Age	H14a, H14b, H14c, H14d	Bilkey and Tesar (1977), Oviatt and McDougall (1994; 1995), Bloodgood et al. (1996), Jones (2001), McDougall et al. (2003), Knight and Cavusgil (2004)	1 item, measured as interval variable, Question G.3
	Education			1 item, measured as ordinal variable, Question G.4
	Experience			1 item, measured as a ratio, Question G.5
	Language Skills			1 item, measured as a ratio, Question G.6

Contextual Dimension Variables

Institutional Connectedness

Drawing from the network- and cluster- approach literatures, the *Institutional Connectedness* construct was developed and measured as a composite index, calculated as a weighted factor score of responses to six items on a five-point Likert scale provided (1=disagree completely; 5=agree completely) in the questionnaire survey (Questions E1_4 to E1_8; E1_15). The six items were based specifically on the “micronet-macronet embeddedness” conceptualisation proposed by Halinen and Törnroos (1998)²¹, referring to the perspective of a single business actor and the connections of this actor with various types of broader networks and larger entities such as regional economic development, industry development and the impact of these on business. Each questionnaire item therefore measures the respondents’ degree of agreement with the access to and/or possession of connections with a variety of actors: (1) the company’s access to established broader networks; (2) the existence of a support structure accessible to businesses; (3) effective initiatives by business-support agencies or governmental agencies; (4) the existence of broader networks (technological, institutional, etc) in the locality or region where the firm operates; (5) the location of the main business network partners in the same city as the company; (6) the involvement of the company with the various

²¹ The micronet is a distinct business activity involving several identifiable business actors, e.g. a triad. A macronet may constitute the broader national and/or institutional networks of business as well as non-business actors (e.g. political and institutional actors), which exert a strong influence on the micronet and its activities. (p.193).

levels of governmental and regulatory agencies, essential for the acquisition of external resources.

Geographical Concentration of Firms

Following past research that suggests the specific effects of geographical concentration of firms in a territorial area (Schmitz, 1999; Pietrobelli, 2002; and Boschma and Ter Wal, 2005), an objective measure of *Geographic Concentration of Firms* was developed. The data for this variable was obtained using information provided in the survey questionnaire by respondents about location of the company (city and federal state) at the time of data collection, and the territorial area for each Brazilian Federal State from The Brazilian Institute of Geography and Statistics (IBGE). The *Geographic Concentration of Firms* was then computed and measured as a dummy variable, calculated by the number of firms in the sample for every 10,000km² of each Brazilian Federal State, with a "high" concentration defined as 1 or more firms, and a "low" concentration as being below that. The codes of "1" and "0" indicate a "high" and a "low" geographic concentration, respectively.

External Constraints for International Operations

The variables included in the *External Constraints for International Operations* construct were derived from the examination of the exporting literature, with a policy-oriented focus. The construct was developed and measured as a composite index, calculated as a weighted factor score of responses to sixteen items on a five-point Likert scale provided in the

questionnaire survey (Questions B13_1 to B13_16). The respondents were asked to indicate to what extent the sixteen items represent constraints on the development of the company's international operations (1=no limitation; 5=high limitation). Consistent with previous research, the sixteen items were compiled through an adaptation of several authors' works. Five items were included in the questionnaire based on studies (MIT Study, 2002; Stefanuto, 2004; Botelho et al., 2005) of barriers faced by Brazilian software firms to operate internationally: (1) taxation, (2) lack of image for Brazilian software internationally, (3) government policy in export assistance, (4) advisory services offered by government, and (5) international agreements. Three items were drawn from Baldauf et al.'s (2000) study of perceived effects of environmental factors on export performance: (1) import tariffs/barriers in international markets, (2) cultural differences, and (3) economic conditions in the foreign markets. Finally, following a study on the perception of export barriers by Brazilian firms by Da Silva and Da Rocha (2001), eight items were adapted to be measured: (1) availability of qualified personnel where the business is located, (2) lack of national export policy, (3) physical and commercial infrastructure, (4) lack of access to information about international markets, (5) availability of financing, (6) excessive bureaucracy, (7) quality certificates, and (8) competition in international markets.

Network Dimension Variables

Participation in Business Networks

Drawing from the network literature, the *Participation in Business Networks* construct was developed and measured in the context of this study

focusing on a single focal actor level of analysis, based on Borgatti and Foster's (2003) conceptualisation of "ego-networks". As discussed in the literature review in Chapter 3, this study applies a definition of business network as "an intentionally created and organised collaboration between two or more actors (firms or institutions) which goes beyond a specific task, with the purpose of achieving a common objective". Using this definition in the questionnaire survey, the *Participation in Business Networks* was captured by asking respondents two specific questions (Questions C1 and C2). First, the participation in the period of 2003-2005, using dummy codes, that is, coded "1" if participation did occur and "0" otherwise. Second, the current participation in any business network, at the time when this survey was conducted, using dummy codes, that is, coded "1" if participation was occurring and "0" otherwise. The *Participation in Business Networks* of a firm was then further divided into "high" participation, defined as a combination of participation both in the past (years 2003, 2004, and 2005) and in the present (at the time of the survey), coded "2"; "low" participation, defined as lack of participation in the past and/or the present, coded "1"; and no participation at all, either in the past or in the present, coded "0".

Collaboration with Foreign Partners

Following the results of a study by the European Network for SME Research (ENSR) (2003) which demonstrates that for internationalised enterprises collaboration with foreign enterprises or partners is more frequent, the construct *Collaboration with Foreign Partners* was developed. To measure *collaboration with foreign partners*, each respondent was asked

to indicate, in seven five-point Likert scale items of the questionnaire survey (Questions B14_1_2 to B14_6_2; B14_9; B14_11), the extent to which the company has developed collaborative arrangements for access to international markets (1=not at all; 5=to a great extent). Each item in the survey questionnaire, treated as a single variable, corresponds to specific types of foreign partners: (1) customers; (2) suppliers; (3) information-technology (IT) companies; (4) universities; (5) business-support agencies; (6) research and technology institutes; and (7) foreign governments, e.g. embassies, consulates.

Trust

The importance of trust as a fundamental enabler to more collaborative relationships in networks has been theoretically argued and empirically established in the network literature. The construct *Trust* was measured as a composite index, calculated as a weighted factor score of responses to seven items on a five-point Likert scale provided in the questionnaire survey (Questions C12_1 to C12_7). The six items were drawn from the sixteen measures of trust developed and empirically tested by Sherer (2003) in a study of 37 critical factors to the network's successful achievement of objectives. Using the set of seven relational measures drawn from Sherer (2003), the survey respondents were asked to indicate to what extent they agreed with the following aspects of their network partners: (1) reliability; (2) willingness to share internal information; (3) willingness to share sensitive data; (4) will not try to go back on their commitments; (5) will

not try to take advantage of the others; (6) fairness in joint negotiations; and (7) similarity of business values.

Commitment

The construct *Commitment* is drawn from the network literature. The construct was measured as a composite index, calculated as a weighted factor score of responses to three items on a five-point Likert scale provided in the questionnaire survey (Questions C12_12 to C12_14). The three items were drawn from the nine measures of commitment developed and empirically tested by Sherer (2003) in a study of 37 factors critical to the network's successful achievement of objectives. Using the set of three relational measures drawn from Sherer (2003), the survey respondents were asked to indicate to what extent they agreed with the following aspects of their network partners: (1) willingness of participants to make internal changes to adapt to the goals of the network; (2) desire of participants to improve their competitive position; and (3) desire of the participants to innovate.

Capabilities of Partners

The construct *Capabilities of Partners* is drawn from the network literature. The construct was measured as a composite index, calculated as a weighted factor score of responses to five items on a five-point Likert scale provided in the questionnaire survey (Questions C12_15 to C12_19). The five items were derived from the measures developed and empirically tested by Sherer (2003) in a study of 37 factors critical to the network's successful

achievement of objectives. Using the set of five relational measures drawn from Sherer (2003), the survey respondents were asked to indicate to what extent they agreed with the following aspects contributing to the success or otherwise of the business network in which the company participates: (1) skills diversity of participants; (2) success of participants independently of the network; (3) profound knowledge of the values and skills of others; (4) criteria for identifying and selecting participants; and (5) explicit procedures for monitoring the performance of participants.

Interdependence between Partners

Drawing on past network studies, the construct *Interdependence between Partners* reflects the extent to which firms need to maintain a relationship with a partner in order to achieve network goals – which is central to understanding exchange relationships (Smith and Barclay, 1999). In this study, the four main interdependency forms and co-ordination mechanisms operating on business networks proposed by Nassimbeni (1998) are used to operationalise *interdependence between network partners*. Thus the construct is operationalised and measured as a composite index, calculated as a weighted factor score of responses to four items (C5_1 to C5_3 and C5_5) on a five-point Likert scale provided in the questionnaire survey: (1) access to resources of partner; (2) complementarity of technical and business activities; (3) need for synchronised response of both partners in mutual business activities; and (4) written agreements.

Governance Mechanisms

The variables included in the *Governance Mechanisms* construct were derived mainly from the examination of the network literature (Jones et al., 1997; Provan et al., 2007), as can be seen in more detail in Chapter 3. This construct was developed and measured as a composite index, calculated as a weighted factor score of responses to six items on a five-point Likert scale provided in the questionnaire survey (Questions E1_9 to E1_14). The respondents were asked to what extent they agreed with the statements that capture aspects of the business network in which they participate: (1) formal terms of collaboration; (2) detailed planning and management; (3) mechanisms for regular communications and operational links; (4) decision-making process; (5) informal social systems in place; and (6) balance of power between partners.

Organisational Dimension Variables

Size of Firm

Because of this research's focus on firm size as a variable within the investigation of internationalisation, it is important to note that a simple universal definition of firm size does not exist due to different size classifications being used in past studies. Therefore, the criterion used in this research for the size of a firm was made compatible with that of The Brazilian Development Bank (BNDES), a federal public company associated with the Ministry of Development, Industry and Foreign Trade (MDIC), in considering

the classes of annual gross revenue employed in the questionnaire²². Thus, categorical data on reported ranges of annual gross revenue in the year 2004 for *firm size* classification was obtained in the questionnaire survey as follows: (1) micro enterprise: <R\$1 million; (2) small enterprise: annual gross operating revenue over R\$1 million and less than or equal to R\$10 million; (3) medium enterprise: annual gross operating revenue over R\$10 million and less than or equal to R\$50 million; (4) large enterprise: annual gross operating revenue over R\$50 million.

Networking Competences

The operationalisation of the construct *Networking Competences* was solely derived from the work of Ritter (1999), Ritter et al. (2002), and Ritter and Gemünden (2003). It is operationalised and measured based on an index, calculated as a weighted factor score of responses to twenty five-point Likert-scale type statements divided into two sub-scales that capture: (1) eleven items related to network management tasks (Questions D1_1 to D1_11); and (2) nine items related to network management qualifications (Questions and D2_1 to D2_9). The Cronbach alpha-values of the overall network competence scale tested by Ritter et al. (2002) in five samples reveal acceptable reliabilities: original German study (.72); UK sample 1 (.84); UK sample 2 (.78); UK sample 3 (.86); and Malaysian student sample (.67).

²²After the empirical part of this research was carried out, the National Statute for Small and Micro Enterprises (Complementary Law No. 123/2006), commonly known as "General Law for Micro and Small Enterprises" or "Super Simples", was enacted in Brazil, on 15 December 2006. By this law, micro and small enterprises are defined as companies with annual gross operating revenues of up to R\$240,000 and R\$2,400,000 respectively.

Technological Capabilities

Based on SME export-performance literature, the construct *Technological Capabilities* is operationalised and measured through a composite index comprising four items in the questionnaire survey (Questions D6_1 to D6_3; D7) measured as a ratio (percentage of R&D investment to the total sales volume in 2003; 2004; and 2005) and one item as an index measure of patents hold in Brazil and abroad.

International Entrepreneurial Orientation

The construct *International Entrepreneurial Orientation* is operationalised and measured by an index, calculated as a weighted factor score of responses to twenty-three five-point Likert-scale type statements, based on the work of Knight (2001) and Brown et al. (2001). With a few adjustments in wording, twelve items were taken and adapted from three scales, originally developed by Khandwalla (1977), Miller and Friesen (1984), and Covin and Slevin (1989), tested in a cross-national survey study of international SMEs by Knight (2001). The three scales were labelled as follows: (1) international entrepreneurial orientation (Questions F1_1 to F1_4); (2) strategic competence (Questions F1_5 to F1_9); and (3) internationalisation preparation (Questions F1_21 to F1_23) with Cronbach's alpha values of .78, .64, and .81 respectively. Eleven items of this study's questionnaire were taken and adapted from three scales within a 20-item measurement instrument of firm-level opportunity-based entrepreneurial behaviour developed and tested by Brown et al. (2001), based on Stevenson's (1983) and Stevenson and Jarillo's (1990) notion of

entrepreneurial management. The three scales were categorised as follows: (1) strategic orientation (Questions F1_10 to F1_13); (2) resource orientation (Questions F1_14 to F1_17); and (3) growth orientation (Questions F1_18 to F1_20) with Cronbach's values of .82, .58, and .71 respectively.

International Experiential Knowledge

The operationalisation of the construct *International Experiential Knowledge* was derived from the work of Johanson and Vahlne (1977), and Eriksson et al. (1997). It is operationalised and measured based on an index, calculated as a weighted factor score of responses to six five-point Likert-scale type items (Questions D8_1 to D8_6). The items measure the importance of the following aspects of a firm's experiential knowledge of the internationalisation process as obstacles to its attempts to do business abroad: (1) lack of command of other languages; (2) lack of knowledge of foreign laws/norms/customs; (3) lack of subsidiaries/affiliates outside Brazil; (4) lack of collaborative agreements with foreign firms; (5) lack of experience abroad; and (6) lack of specific competence/knowledge in relation to procedures.

Entrepreneur-related Dimension Variables

Age, Education, Experience, and Language Skills

Age of the entrepreneur was operationalised and measured as interval variables, classified into six age groups (up to 21; 22–30; 31–40; 41–50; 51–60; and over 60), while *Education* was measured as ordinal variables into five categories (no formal education; primary education; secondary

education; undergraduate degree; and postgraduate degree). *Experience* was measured on the ratio level, as the number of years of experience the entrepreneur has in the software and allied services sector. Finally, *Language Skills* were also operationalised at the ratio level, measured into five categories of number of languages, apart from Portuguese, that the respondent has the ability to conduct business in (none; 1; 2; 3; 4 or more).

Control Variables

There are some firm-specific factors that may also affect the hypothesised relationships, and therefore two control variables were introduced in the analysis: *Firm Age* and *Areas of Activity*.

Previous studies have indicated that the history of a firm guides present postures and can generate settled processes and routines that constrains innovative and risk taking behaviour such as strategies of expansion through international markets (Teece et al., 1997; Balabanis and Katsikea, 2003; George et al., 2005). A firm's age determines its ability to adopt an international entrepreneurial posture (Balabanis and Katsikea, 2003; Yiu et al., 2007). *Firm Age* (Question A3 of the survey questionnaire) was measured by subtracting the year of establishment and the year of this study's data collection.

Also, it has been noted that a significant feature of software firms is the area of activity within the industry, characterising the types of products and services commercialised through the operation of distinct business models (Rocha, 1998; Roselino, 2006a; Roselino, 2006b). This characterisation has important consequences on market structures, levels of

technological innovation, specialisation of the workforce, and also on the competitive position of Brazilian firms in both the domestic and international markets (Roselino, 2006b; Softex, 2009). The areas of activities were classified, according to question A1 of the survey's questionnaire, into five categories: outsourcing (of personnel, equipment, systems, etc); bespoke software; customised software; packaged software; and embedded software. *Areas of Activity* was operationalised in the form of dummy variables, coded as "1" for each of the five categories, and "0" otherwise.

4.6.2 Measurement of Constructs: Reliability and Factor Analysis

The Cronbach's alpha reliability coefficient was employed in a series of statistical tests to assess the reliability of twelve of the study constructs. This statistic is the most widely used measure (Hair et al., 2006) which helps to examine whether the individual variables of these scales are measuring the same construct. In line with the author, threshold values above .60 were adopted as representing the lower limit of acceptability to pass the reliability check.

Table 4.9: Alpha Coefficients of Multi-item Scale Constructs of this Study

Dimension	Constructs	No. of variables	Cronbach's alpha	Standardised item alpha
Contextual	Institutional Connectedness	6	.79	.80
	External Constraints for International Operations	16	.89	.89
Network	Collaboration with Foreign Partners	7	.72	.78
	Trust	7	.78	.78
	Commitment	3	.71	.72
	Capabilities of Partners	5	.74	.74
	Interdependence between Partners	4	.73	.73
	Governance Mechanisms	6	.87	.87
Organisational	Networking Competences	20	.92	.93
	Technological Capabilities	4	.77	.64
	International Entrepreneurial Orientation	23	.83	.84
	International Experiential Knowledge	6	.78	.79

As shown in Table 4.9, Cronbach's alpha values of all variables belonging to the twelve multi-item scale constructs proposed were beyond .70, while only one – *Technological Capabilities* – was below this value, suggesting the constructs are acceptably reliable, being supported as part of meaningful underlying structures. It should be noted that some variables are directly measured in this study, being not characterised as multi-item scale constructs that require operationalisation: *Size of Firm*; *Geographic Concentration of Firms*; *Participation in Business Networks*. Also, the entrepreneur-related variables (*Age*; *Education*; *Experience*; and *Language Skills*), fall into this category. Thus, these variables are not included in Table 4.9.

Factor Analysis

After computing the Cronbach's alpha for construct reliability, a factor analysis was performed on the set of items pertaining to each of the twelve multi-item scale measured constructs in order to calculate weighted factor scores.

Factor Analysis was used to construct an index by company bringing together the information contained in the variables of interest, taking into account the importance (loading) of each. Once the estimation of loading was completed, the Weighted Least Squares (WLS) method was used to estimate the score (index) of each company. For the development of a single score, only the first factor was retained. In fact, this factor carries most of the information contained in the data.

One way to assess the suitability of the factorial design is from the criterion of Kaiser-Meyer-Olkin. Because not all items of each of the twelve constructs loaded significantly, the Kaiser-Meyer-Olkin Test was carried out as a further statistical assessment to determine the overall fit of the factorial model.

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy indicates the partial correlation coefficients among the items and ranges between 0 and 1. A KMO near 1 supports a factor analysis and anything less than 0.5 is probably not qualified to support useful factor analysis (Pett et al., 2003). As indicated in Table 4.10, the Kaiser-Meyer-Olkin (KMO) statistical test displays satisfactory results.

Table 4.10: Suitability of Factorial Design: KMO Test Results

Construct	KMO
Institutional Connectedness	0,77
External Constraints for International Operations	0,75
Collaboration with Foreign Partners	0,69
Trust	0,74
Commitment	0,61
Capabilities of Partners	0,63
Interdependence between Partners	0,68
Governance Mechanisms	0,84
Networking Competences	0,88
Technological Capabilities	0,70
International Entrepreneurial Orientation	0,79
International Experiential Knowledge	0,76

4.6.3 Comparison between Exporters and Importers

This section discusses differences between groups of firms in regard to the nineteen constructs of the study. The differences in the values of the constructs between groups of exporters versus non-exporters and importers versus non-importers might be of interest to this study. Thus the Mann-Whitney U test was applied to compare the means of the study constructs between these groups. The results are shown in Table 4.11.

Table 4.11: Means of Study Constructs and Mann-Whitney U Test

Dimension	Construct	Exporters				Importers			
		Yes	No	z	p	Yes	No	z	p
Contextual	Institutional Connectedness	4.5	3.7	2.3	0.02	3.9	3.7	-0.7	0.48
	Geographic Concentrations of Firms	0.6	0.5	0.7	0.45	0.5	0.5	-0.8	0.43
	External Constraints for International Operations	4.8	5.4	2.6	0.01	4.9	5.4	1.7	0.09
Network	Participation in Business Networks	0.7	0.4	2.6	0.01	0.5	0.4	-0.7	0.47
	Collaboration with Foreign Partners	-85.5	-9.7	-2.8	0.01	-29.4	-10.6	2.9	0.00
	Trust	5.8	5.9	-0.4	0.67	5.8	6.0	1.4	0.16
	Commitment	4.6	4.5	0.1	0.92	4.5	4.5	0.3	0.80
	Capabilities of Partners	4.7	4.9	-0.6	0.54	4.7	5.2	1.2	0.24
	Interdependence between Partners	4.4	3.9	1.6	0.11	3.2	4.0	-0.6	0.55
	Governance Mechanisms	3.5	3.1	1.7	0.09	5.8	3.2	-0.4	0.69
Organisational	Size of Firm	4.4	2.5	3.7	0.00	3.1	2.3	-2.5	0.02
	Networking Competences	5.6	4.9	3.0	0.00	5.1	4.9	-0.7	0.51
	Technological Capabilities	17.4	16.8	0.3	0.75	17.7	15.3	-1.3	0.21
	International Entrepreneurial Orientation	6.5	5.5	3.7	0.00	5.7	5.7	0.0	0.99
	International Experiential Knowledge	4.7	5.1	-1.7	0.09	5.0	5.1	0.9	0.38
Entrepreneur	Age	3.3	3.4	-0.7	0.52	3.3	3.6	1.3	0.18
	Education	4.6	4.5	0.7	0.49	4.5	4.5	0.2	0.85
	Experience	14.2	16.6	-1.3	0.20	15.0	18.7	2.5	0.01
	Language Skills	2.6	2.0	2.9	0.00	2.2	2.0	-1.1	0.28

Assuming a significance level of 10 percent, Table 4.11 shows that there were differences in both the comparisons between exporters and non-exporters, and importers and non-importers.

For exporters, the test showed that statistically significant differences are present in several constructs: *Institutional Connectedness*, *External Constraints for International Operations*, *Participation in Business Networks*, *Collaboration with Foreign Partners*, *Governance Mechanisms*, *Size of Firm*, *Networking Competences*, *International Entrepreneurial Orientation*, *International Experiential Knowledge*, and *Language Skills*. As for importers, the statistically significant differences are present in fewer constructs: *External Constraints for International Operations*, *Collaboration with Foreign Partners*, *Size of Firm*, and *Experience*.

4.6.4 Data Processing and Analysis

Responses to the questionnaire items were entered into Statistica 7.0, a statistical software package for Windows database (<http://www.statsoft.com/>). All data used in the analysis were from the survey instrument. The organisation of the raw data was done through editing and cleaning the collected data within the statistical software database before analysis, a step followed by the researcher (Frankfort-Nachmias and Nachmias, 1996).

Outliers and Missing Data

As Hair et al. (2006) recommend, a structured process to address outliers and missing data was adopted. The approach taken to deal with missing data in this study involved examining the patterns of the data to determine the extent of the missing data for individual variables, individual cases, and overall, and implementing the appropriate remedies. Resulting from this process, as mentioned previously in this chapter, three companies were taken out of the analysis because the amount of missing data was above 50 percent in each questionnaire.

The variables to be imputed are the dummies for export and import (EXP20051 and IMP20051) B2_3 and B4_3, besides those used in the definitions of the constructs, which have missing values.

To deal with missing data in the analysis, the imputation methods using only complete data were not chosen because of their great impact on sample size reduction. Therefore, following Hair et al. (2006) a multiple imputation strategy was applied across all individual cases:

(1) For ordinal variables: the Spearman correlation matrix was calculated within each set of variables forming the constructs. For each variable of interest the value of the variable most correlated was imputed. If the variable most correlated was also missing for that observation, the value of the 2nd largest correlation was attributed to the variable, and so on. For the cases in which all variables were missing within a questionnaire block for the same company, a search was made in different blocks, following the same approach of the Spearman Correlation Matrix. The few missing values remained were imputed with the value of the variable mode.

(2) For quantitative variables: the imputation of the variables D6_1, D6_2, and D6_3 was made from simple OLS regression models, combining these variables in pairs. Intuitively, R & D investment values in a given year could be explained by values of investment in other years. For the variable B4_3 a regression model was estimated in which the explanatory variable was B4_2. For cases in which D6_1, D6_2, and D6_2 D6_3 are missing for the same company, the imputation was made from random numbers drawn from normal distributions with means and standard deviations equal to the sample. The same procedure was carried out for the variable B2_3 where B2_2 was the explanatory variable of the regression model.

(3) For binary variables: an attempt was made to fit a logistic model for these variables initially, but no good fits were obtained with these models, especially for variable D7_2, which had only four cases of success (the existence of patents abroad). It was decided therefore to use Discriminant Analysis. This technique creates a classification rule based on empirical knowledge that reclassifies the existing data. Hence, for the missing cases values 0 or 1 obtained in the discriminant analysis were imputed. The remaining missing cases were charged with the values of the variable mode.

As regards outliers, no cases in this study's sample proved to be unrepresentative of the population because of extreme characteristics of variables.

4.7 Analytical Techniques

During the data analysis process, several statistical techniques were implemented with the use of the statistical software package Statistica

version 7.0. First, a descriptive statistical analysis was carried out to provide an overview of the data. Second, the links between the various explanatory variables and the dependent variables were tested using techniques such as Spearman's correlation analysis, and some other statistical tests such as Mann Whitney U Test. Third, for measuring the reliability of the constructs, Cronbach's alpha reliability analysis was used.

Finally, in order to test the simultaneous links between the dependent and the explanatory variables, two multivariate techniques were adopted. First, the multidimensional scaling (MDS) method, particularly adequate for the analysis of ordinal data, was used during the data-analysis process to assist the researcher in gaining deeper insights into the underlying dimensions and structure of some important constructs. Second, the logistic regression analysis was chosen as the main multivariate analytical technique for this research with which to test the relationships between the various explanatory variables and the internationalisation variables.

Logistic Models

In order to ascertain the determinants of exports and imports logistic models have been proposed for each dependent variable (exports and imports). The theoretical models consider nineteen explanatory variables: the twelve multi-item scale constructs obtained through Factor Analysis, the dummies of *Geographical Concentration of Firms*; *Participation in Business Networks*; and *Size of Firm*; and the entrepreneur-related variables (*Age*, *Education*, *Experience*, and *Language Skills*).

Nevertheless, one problem that arises is the large amount of missing values for the constructs whose formation depends on variables of the blocks B and C of the questionnaire, since not all respondents responded to these blocks (only export companies responded to the block B, while companies that participated in some business networks responded to the block C). These constructs are: *External Constraints for International Operations; Trust; Commitment; Capabilities of Partners; Interdependence between Partners*. As a result, only 28 companies could be used to estimate a logistic model with all the study's constructs and variables, which causes a problem of inconsistency in the estimates. It was decided therefore to estimate the models with only the constructs that have no variables in blocks B and C in their formations.

Thus the remaining constructs/variables available for logistic regression analysis are fourteen: *Institutional Connectedness; Geographic Concentrations of Firms; Participation in Business Networks; Collaboration with Foreign Partners; Governance Mechanisms; Size of Firm; Networking Competences; Technological Capabilities; International Entrepreneurial Orientation; International Experiential Knowledge; Age; Education; Experience; and Language Skills*.

Statistical Assumptions in Logistic Models

There are statistical assumptions in logistic models that should be assessed (Peng et al., 2002). First, given the non-normal distribution of the data, the most fundamental statistical assumption in multivariate analysis is achieved. Second, the dependent variable should be dichotomous, which is

the case of both the dependent variables of exports and imports. Third, there should be no outliers in the data, an issue discussed in Section 4.6.4. Fourth, the effect of multicollinearity among the explanatory variables needs to be checked for. In order to identify possible multicollinearity problems, a Pearson's correlation matrix was calculated (Table 4.12). Even though there were a number of statistically significant relationships, the correlations are below the commonly used cut-off threshold value of 0.7.

Furthermore, a second measure of multicollinearity, the variance inflation factor (VIF), was calculated to provide an indication of multicollinearity problems between constructs used in the logistic models. An assessment of the VIF results showed that all values ranged between 1.25 and 3.50, which are well below the standard cut-off level of 10. (Hair et al., 2006), making the constructs/variables under examination adequate to employ in testing the proposed logistic models. Although included in the logistic models, the constructs *Geographic Concentration of Firms*, and *Participation in Business Networks*, as well as the control variable of *Areas of Activity* are not included in the correlation matrix because they are dummies.

Fifth, the sample size is particularly important in fitting with the maximum likelihood method. Considering the relatively small sample size of this study (148 firms), it was necessary to assess the adequacy of the sample size for the planned logistic regression analysis. This assessment shows that the full sample size exceeds the recommended minimum 5:1 observation-to-predictor ratio proposed by Hair et al. (2006).

Table 4.12: Descriptive Statistics and Pearson's Correlation Matrix

Construct	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Institutional Connectedness	3.84	1.62	1												
2. Governance Mechanisms	3.17	1.63	0.47***	1											
3. Networking Competences	5.04	1.05	0.35***	0.35***	1										
4. Technological Capabilities	16.96	17.43	0.01	-0.05	0.01	1									
5. International Entrepreneurial Orientation	5.72	1.23	0.20**	0.16**	0.52***	0.00	1								
6. International Experiential Knowledge	5.01	1.27	0.12	0.07	0.06	0.04	0.10	1							
7. Collaborative Arrangements with Foreign Partners	-23.54	99.10	-0.11	-0.13	-0.18**	0.13	-0.15*	-0.01	1						
8. Size of Firm	2.87	2.01	0.18**	0.04	0.43***	-0.16**	0.21**	-0.02	-0.52***	1					
9. Age	3.40	0.93	0.05	-0.05	0.04	-0.03	-0.05	0.04	-0.10	0.23*	1				
10. Education	4.49	0.58	0.16*	0.13	0.15*	-0.21***	0.03	0.00	-0.01	0.17**	0.03	1			
11. Experience	16.17	7.94	0.09	0.05	0.08	-0.07	-0.03	0.10	-0.09	0.19**	0.68	-0.04	1		
12. Language Skills	2.12	0.80	0.15*	0.02	0.14*	0.04	0.15*	-0.12	-0.00	0.18**	0.05	0.09	0.04	1	
13. Age of Firm	10.73	6.52	0.12	0.00	0.07	-0.12	-0.06	0.02	-0.27***	0.48***	0.32***	0.03	0.39***	0.02	1

Note: ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

4.8 Sample Characteristics

This section conveys the characteristics of sampled firms followed by an examination of some demographic aspects of the respondents. This broader examination is useful as a background for further analysis in the study.

Profile of the Companies

Ownership Structure

Table 4.13 shows the ownership structure of the firms surveyed.

Table 4.13: Ownership Structure of Firms Surveyed

Type of Ownership	Frequency	Percent of Total Frequency
Independently owned and operated	139	93.9
Wholly-owned subsidiary of a national holding company	4	2.7
Partially-owned subsidiary of a national holding company	2	1.4
Joint venture between local companies	1	0.7
Other	4	2.7

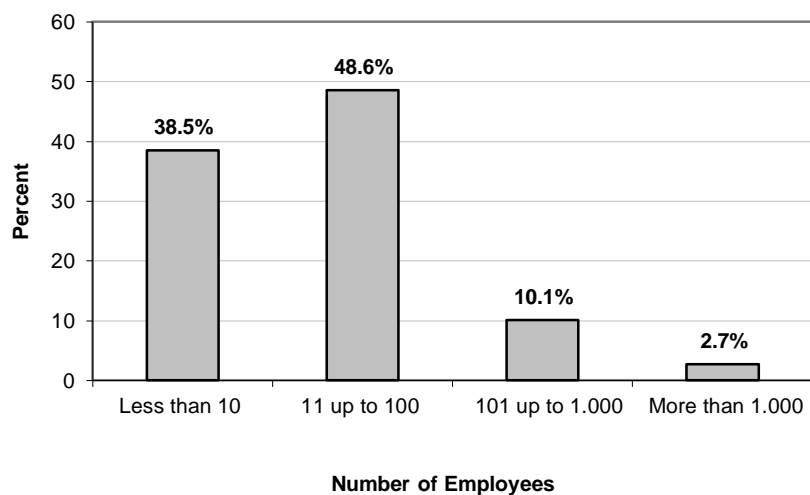
The vast majority of firms, almost 94 percent, are owned and operated independently. None of the firms in the survey had any kind of foreign ownership or affiliations, offering an indication of their operations being domestically focused.

Number of Employees

Following the general pattern of business demographics of Brazilian firms, the vast majority of companies in the sample (87.1 percent) are,

regarding the number of employees, of smaller size, with less than 100 employees as indicated in Figure 4.3.

Figure 4.3: Distribution of Number of Employees

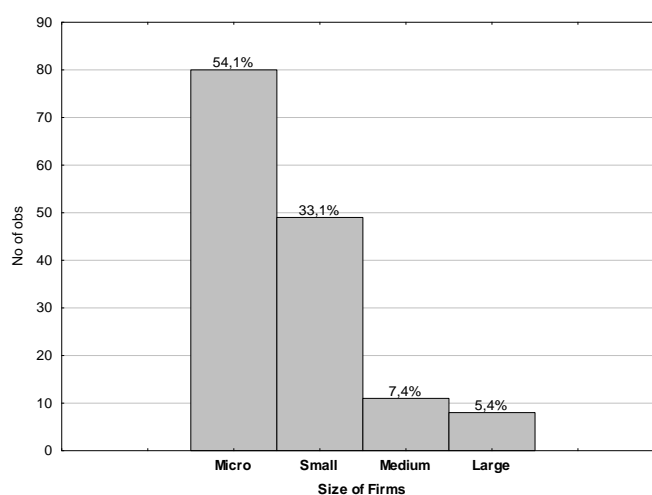


A calculation of the mean revealed an average number of 110.5 employees with a standard deviation of 438.7 employees.

Size of Firms

Firms were categorised according to their size, taking into account the classification by revenue adopted for this study (see Section 4.6.1). The results are in Figure 4.4.

Figure 4.4: Distribution of Firms by Size

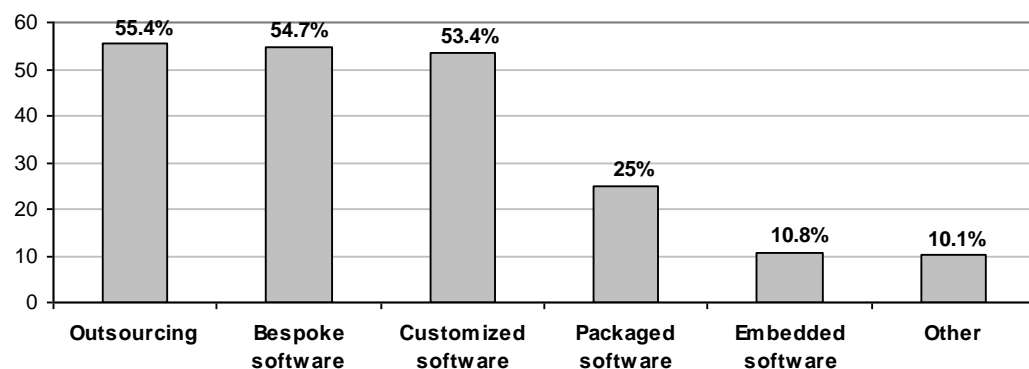


The great majority (95.5 percent) of companies in this study's sample is of smaller size, as Figure 4.4 illustrates. This follows the pattern observed in other studies in Brazil, which show the prevalence of SME companies as being the major constituent of the private sector in the economy generally, as well as in the software and allied services sector.

Areas of Activity

In order to characterise the activities of the surveyed firms in the software and allied services industry, these activities were divided into five categories: outsourcing (of personnel, equipment, systems, etc), bespoke software, customised software, packaged software and embedded software. The main areas of activities of surveyed firms are shown in Figure 4.5.

Figure 4.5: Main Areas of Activity of Firms



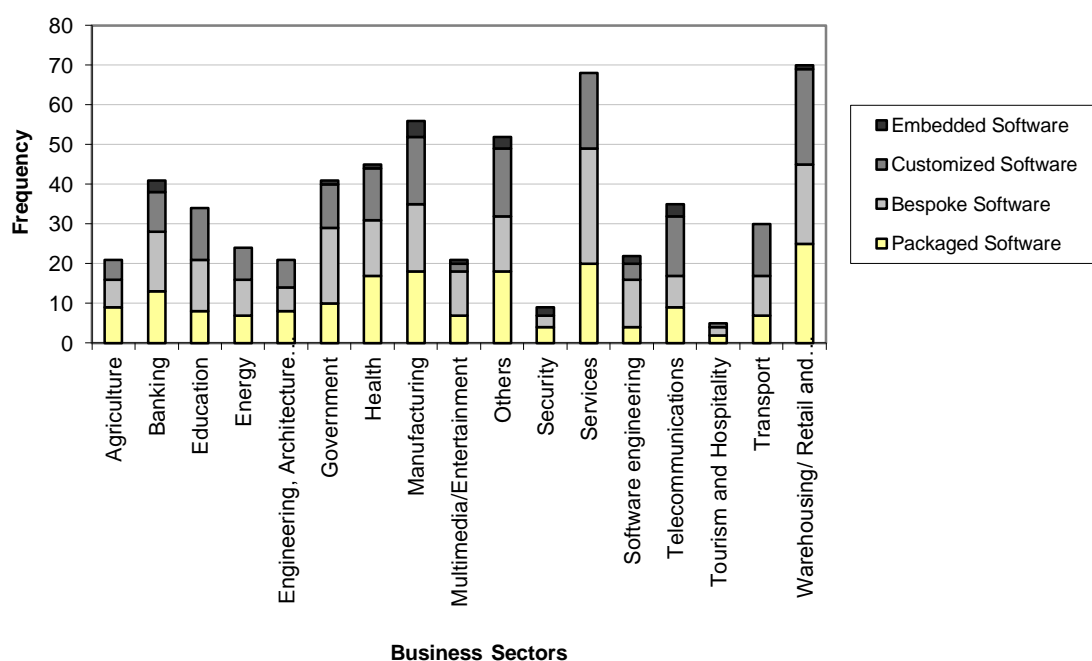
It can be seen from the figure above that outsourcing, bespoke and customised software were almost equal as principal areas of activity, displaying the highest percentages among the options considered by firms. From Figure 4.5 we can also see that more standardised activities, delivered to customers in the same product format, often referred to as packaged software, are cited by 25 percent of the surveyed firms as the main area of

activity, followed by embedded software, which is built into other products, with 10.8 percent of respondents.

Products and Services

Figure 4.6 shows the great diversity of business sectors to which firms in the software and allied services industry in Brazil direct their products and services. Looking at the figure, it can be noted that seven specific business sectors, among the sixteen listed, appear to be leading sales volumes among surveyed firms: warehousing, retail and distribution; services; manufacturing; health; banking, and government.

Figure 4.6: Sales Volumes by Products/Services



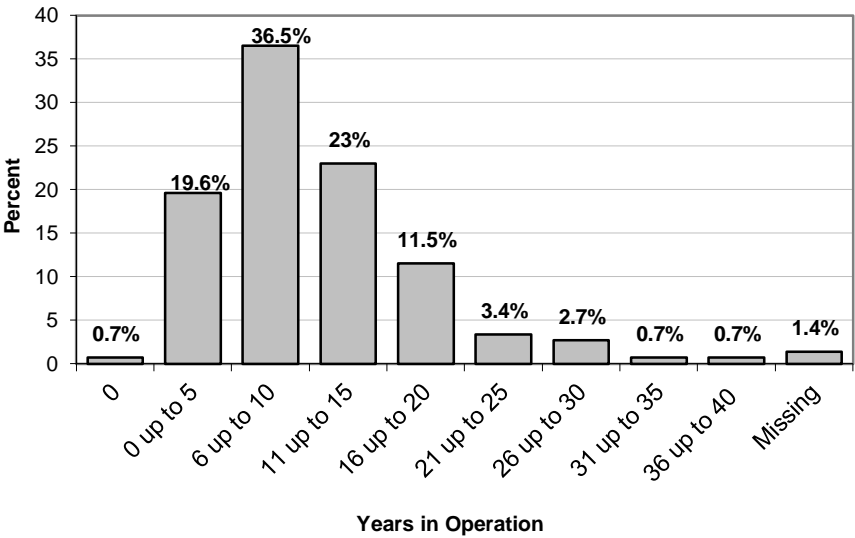
Among the second tier of leading business sectors in sales volumes for surveyed firms, it is possible to identify three other industry segments: transport, education, and telecommunications. It has to be noted that since

firms could sell their products and services to more than one business sector, the overall sums of the frequencies can reach above 100 percent of the total number of firms in this sample.

Years of Operation

As illustrated in Figure 4.7, the majority of firms, nearly 57 percent, had been 10 or fewer years in operation, at the time when this survey was conducted.

Figure 4.7: Distribution of Years of Operation

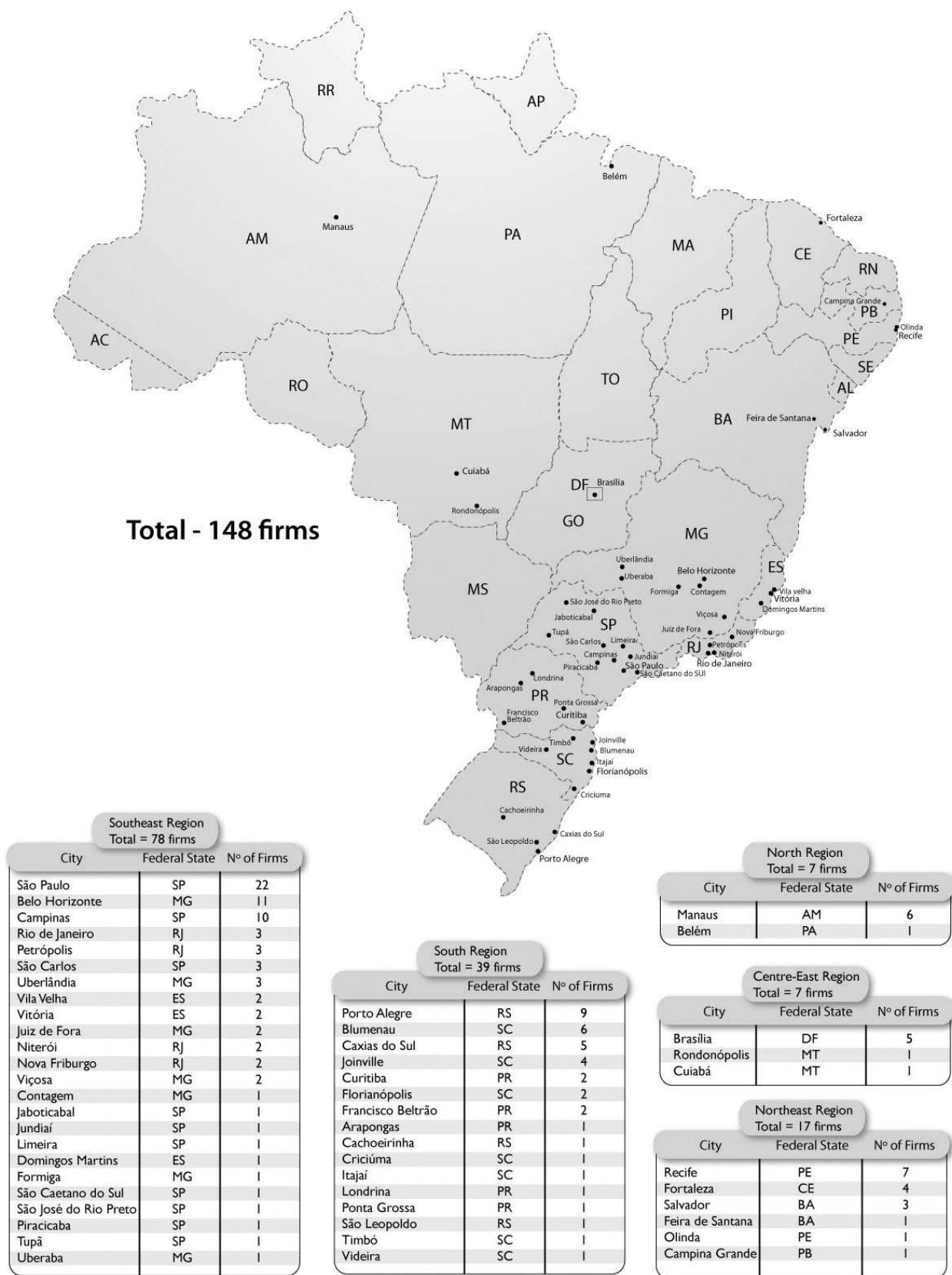


When the mean age is calculated, a value of 10.7 years is obtained with a standard deviation of 6.5 years.

Location

In Figure 4.8, the distribution of firms by each Federal State in Brazil is displayed. The Southeast followed by the South are the regions responsible for the majority (79 percent) of respondent firms in which it is possible to note that the States of São Paulo (SP) and Minas Gerais (MG), both in this region, account for 43 percent of respondent firms.

Figure 4.8: Geographical Distribution of Responding Firms in Brazil



Internationalisation Characteristics

The internationalisation of 148 companies in the sample can be classified between exporting and importing activities in 2005. The distribution of companies is in Table 4.14.

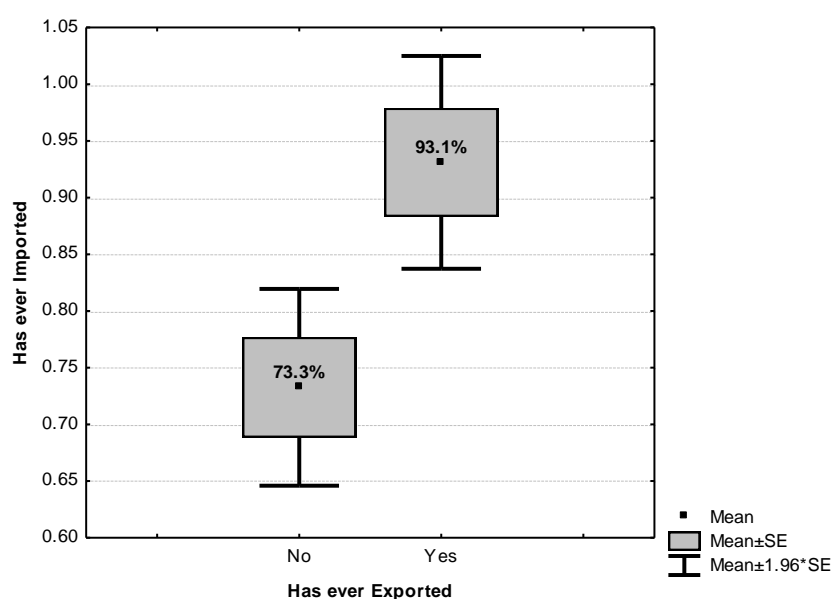
Table 4.14: Frequency Distribution - Exporting versus Importing

	Non-importing	Importing	Total
Non-exporting	44 (30%)	77 (52%)	121 (82%)
Exporting	2 (1%)	25 (17%)	27 (18%)
Total	46 (31%)	102 (69%)	148 (100%)

In order to verify if the dependent variables "exports" and "imports" are independent a Fisher's exact independence test was applied. The result showed a bilateral p-value of 0,0025 showing that the variables are not independent.

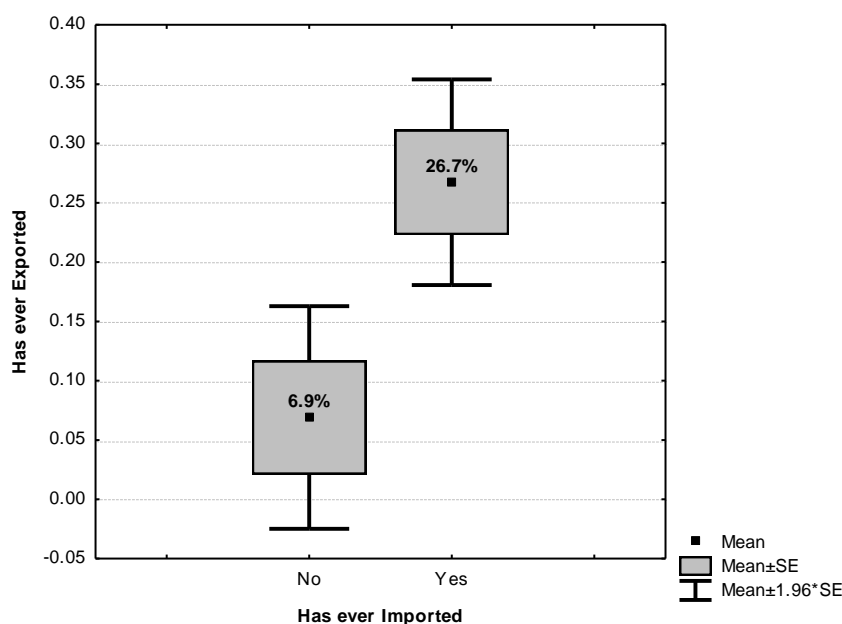
The paired Student's t-tests carried out also confirm the interplay between imports and exports, as shown in Figures 4.9 and 4.10.

Figure 4.9: Proportion of Firms that Imported vs. Exported



The above difference between the proportion of firms that had ever imported as a function of a firm having ever exported was statistically significant (Student's t-test for independent groups with $t=-2.290$ and $p\text{-value}$.02). Having ever exported increases 1.3 times the likelihood of importing.

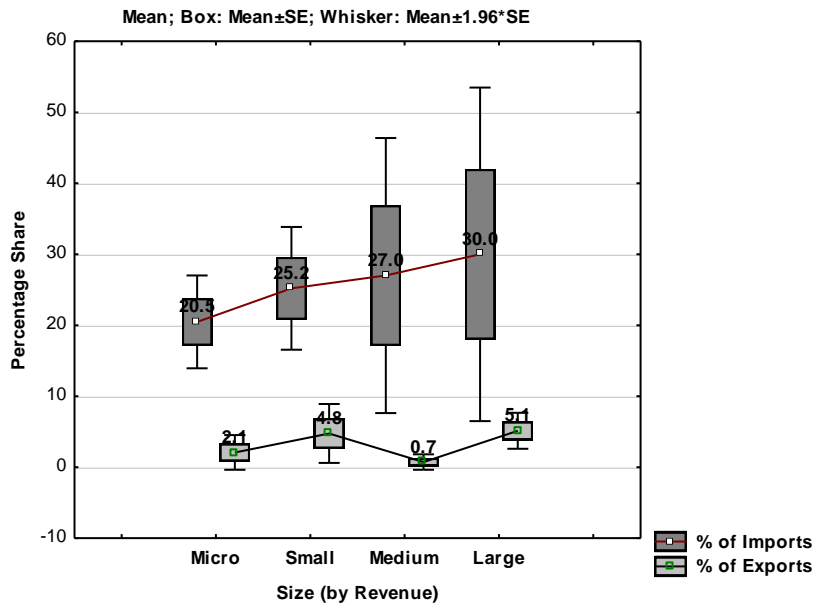
Figure 4.10: Proportion of Firms that Exported vs. Imported



The above difference between the proportion of firms that had ever exported as a function of a firm having ever imported was statistically significant (Student's t-test for independent groups with $t=-2.290$ and $p\text{-value}$.02). Having ever imported increases four times the likelihood of exporting.

Looking at Figure 4.11, it can be observed that the mean percentages of both imports and exports in 2005 are considerably lower for micro and small than for larger companies. Curiously, medium-sized firms had lower mean percentages of exports than micro and small firms.

Figure 4.11: Boxplot – Imports and Exports in 2005 by Size of Firms

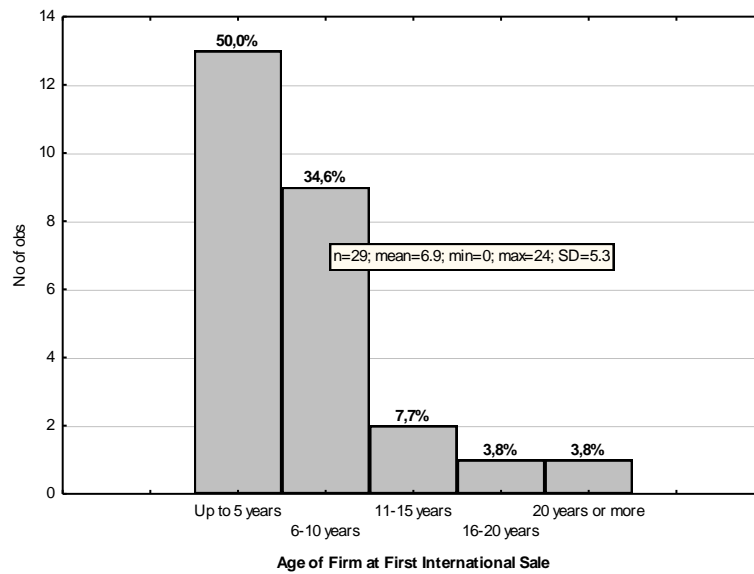


In line with Sullivan (1994), structural and attitudinal attributes can also be used to characterise the internationalisation behaviour of firms in the sample. Structural measures, such as foreign establishment modes used to service international markets, and the presence of an import/export department in the firm, are outlined, and attitude measures, such as the entrepreneurial ability to enter foreign markets shortly after inception, a planned approach to internationalisation, and the geographical diversity of international markets, are included in the subsequent analysis.

Age of Firm at First International Sale

The results shown in Figure 4.12 demonstrate the experience with outward internationalisation of participating firms, illustrating the distribution of firms according to the age of the firm when its first international sales were achieved. Twenty nine of the 148 software firms surveyed undertook international sales at some stage of the company's life since its foundation.

Figure 4.12: Distribution of Firms by Age at First international Sale (n=29)



From Figure 4.12, the relatively early beginning of outward internationalisation of software firms in the sample can be observed, as 50 percent of these internationalised firms achieved their first sales to foreign markets within the first five years of operation. Four companies in the sample had their first sales abroad within 2 years from inception, and could be considered “born global” or “international new ventures”, if we consider the subjective cut-off point of 2-3 years, suggested by many authors (Knight and Cavusgil, 1996; Oviatt and McDougall, 1997, 1994; Madsen et al., 2000; Chetty and Wilson, 2003), to differentiate between the so-called “born global” firms and late internationals.

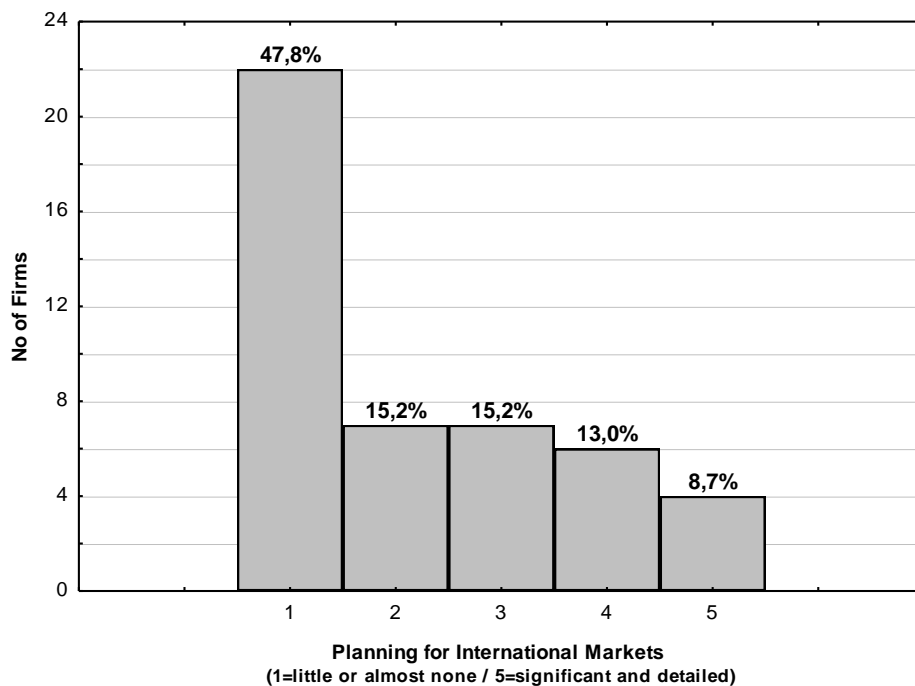
Existence of Internationalisation Department

Study respondents were asked to report the existence of a specific department within the firm to deal with import or export matters, with the vast majority of firms (71 percent) reporting they did not have such a department within the company.

Formal Planning

Figure 4.13 illustrates the distribution of all scores given by firms regarding the extent to which they adopt a formally planned strategy for entering into foreign markets.

Figure 4.13: Planning Approach to Internationalisation (n=46)

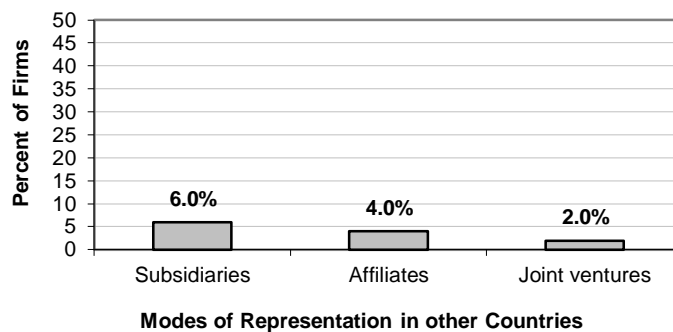


Looking at the results of the 46 respondents who completed this question, it can be observed that only 21.7 percent of firms provided a rating of 4 or 5, indicating the adoption of a more detailed market planning to evaluate international markets. The majority of respondents (63 percent) rated 1 or 2, showing evidence of the limited use of formal preparations before firms decide to venture into foreign markets.

Modes of International Representation

Figure 4.14 describes the distribution of respondent firms by the mode of international representation utilised.

Figure 4.14: Distribution of Modes of International Representation

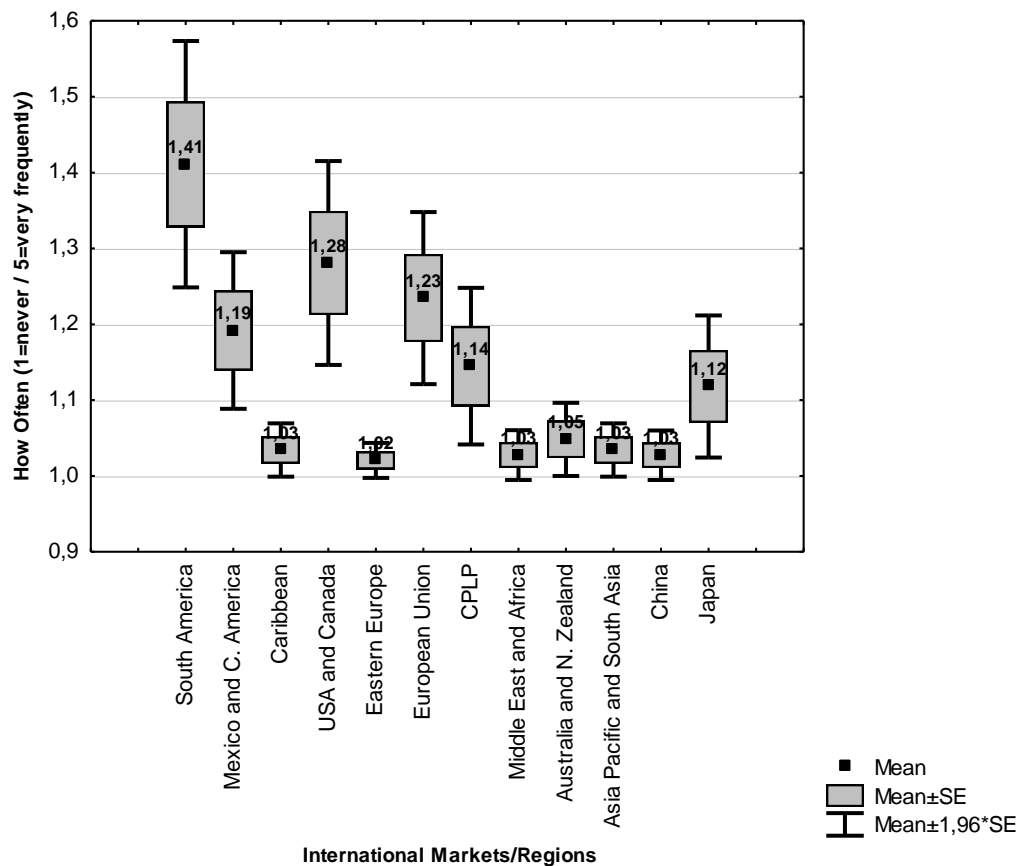


When examining the firms' operations abroad, it is possible to see that only a very small proportion of software firms possess some kind of representation in foreign countries, as Figure 4.14 shows. Of the total sample, only 6 percent of firms had subsidiaries abroad, followed by the modes of affiliates, with 4 percent, and joint ventures, with 2 percent of the firms surveyed.

International Sales Markets

Study participants were also requested to rate the frequency with which their firms sell to specified international geographical markets. Figure 4.15 displays the mean score ratings for sales in international markets.

Figure 4.15: Boxplot – Sales to International Markets/Regions



From Figure 4.15, the narrow spread of export destinations among respondent firms can be seen. On a 5-point scale, the higher mean scores were obtained by South America (1.41), followed by the USA and Canada (1.28), and the European Union (1.23). Other regions were less frequently served markets and therefore were rated lower. Mexico and Central America, the CPLP Community of Portuguese-Speaking Countries (Portugal, East Timor, Angola, Cape Verde, Guinea-Bissau, Mozambique, and São Tomé & Príncipe), and Japan appear as a second-tier of international markets for software firms in our sample. A calculation of the mean number of foreign markets revealed an average number of 1.03 countries with a minimum of 0 and maximum of 20 countries (standard deviation of 2.93 countries).

Jones and Coviello (2005, p. 290) argue that time-based dynamics form a key element of internationalisation, understood as a behavioural process in that each firm has a history of internationalisation events. Hence this research incorporates a temporal dimension for the international evolution of firms by measuring the dependent variables over time, from 2003-2005, allowing for more depth in understanding trends of internationalisation patterns. This is also discussed subsequently.

Trends

Participants in this investigation were asked to examine the occurrence of imports and exports in their firms, for the years 2003, 2004, and 2005. In Table 4.15, the descriptive statistics of imports and exports for this period, as percentages of total supplies and total sales, respectively, have been summarised. These results illustrate the internationalisation trends of software firms in the period of 2003-2005, from both outward and inward perspectives.

Table 4.15: Descriptive Statistics for Imports and Exports (2003-2005)

International Operations								
Share of Foreign Acquisition to Total Supplies (Imports)					Share of Sales to International Markets (Exports)			
Year	N	% of all Firms	Mean	SD	N	% of all Firms	Mean	SD
2003	89	68.5	28.25	26.60	19	12.8	11.35	14.60
2004	91	70.0	27.53	27.11	25	16.9	14.12	17.80
2005	94	72.3	28.46	27.29	26	17.6	17.99	22.58

As can be noted from Table 4.15, the number of firms which reported acquisition of inputs of foreign goods increased almost 6 percent in the period, while the mean values exhibited a decrease from 2003 to 2004, remaining steady in 2005. Statistical testing showed that neither the number of firms nor the mean values for the period of 2003-2005 are statistically significant (Wilcoxon Matched-Pairs Test).

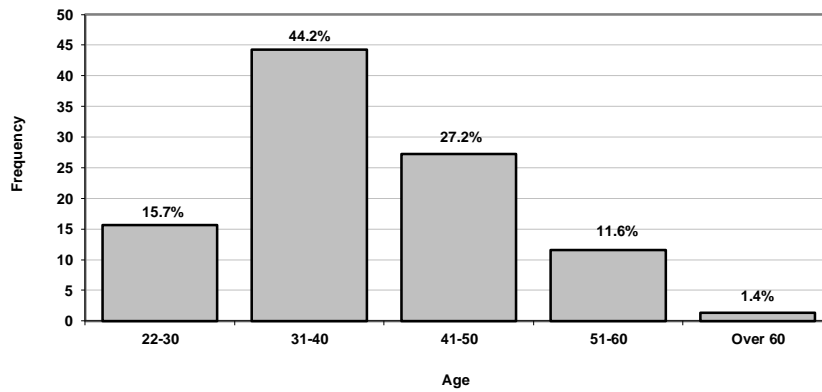
As for exports, the scenario is quite different from imports. Although the actual number of firms actively involved in exports is much smaller than those in imports (Table 4.15), there was an increase of nearly 37 percent in the number of firms reporting international sales, from 2003 to 2005, and of 58 percent in the mean values of exports from 2003 to 2005. The results of a hypothesis test performed on exports for the period between 2003 and 2004 reveal that both the increase in the number of firms and the increase in mean values are statistically significant ($p < .05$ Wilcoxon Matched-Pairs Test).

Profile of the Respondents

Gender, Age, Nationality and Education

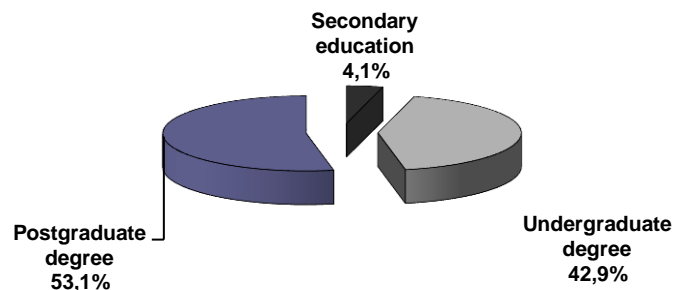
The vast majority of survey participants were male respondents, with 129 questionnaires completed, corresponding to 88 percent of the total number of responses obtained, while only 18 female participants completed the questionnaire (i.e. 12 percent). All participants in this study were of Brazilian nationality.

Figure 4.16: Age Distribution of Respondents



As illustrated in Figure 4.16, among the 148 individuals who responded to this study, 88 participants (i.e. 60 percent) were under 40 years of age, with a predominance of those of 31 to 40 years (i.e. 44.2 percent). While the group of 41 to 50 years consists of 40 participants (i.e. 27.2 percent), only 19 of those participating in this survey were older than 51 years of age (13 percent). The survey participants show high levels of educational attainment (see Figure 4.17).

Figure 4.17: Educational Levels of Respondents



As can be seen in the above figure, respondents are highly qualified, with the vast majority of them (96 percent) holding either undergraduate or postgraduate degrees.

Amount of Experience in the Software Industry

Among the 145 participants who pointed out how many years of experience they had already completed in the software industry at the time of the survey, the great majority (74 percent) indicated 10 or more years of experience. The mean number of years of experience in the sample is 16.16 years with a standard deviation of 7.94 years.

Languages Spoken

The ability of participants to conduct business in other languages apart from Portuguese is shown in Table 4.16.

Table 4.16: Foreign Languages Spoken by Respondents (n=147)

Number of Foreign Languages	Frequency	Percent of Total Frequency
None	35	24
1	65	44
2	42	29
3	5	3
4	0	0

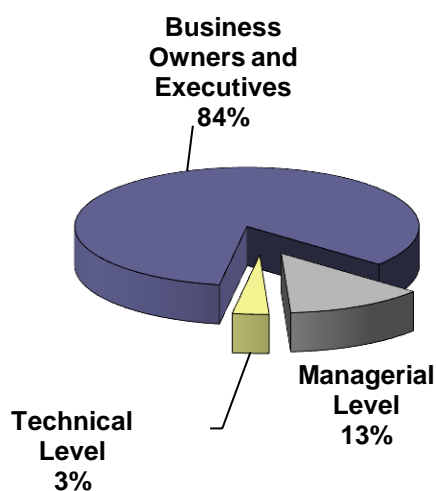
The results shown indicate that the vast majority of participants (76.2 percent) speak at least one foreign language. By breaking down this percentage, it is possible to note that 44 percent of them speak one foreign language, whereas 29 percent and only 3 percent of participants of the total

sample had the ability to conduct business in 2 or 3 languages, respectively. Nevertheless, a smaller percentage of respondents (24 percent) reported no knowledge of any foreign language.

Position Occupied

When the positions of respondents are examined (see Figure 4.18), it can be noted that 84 percent of them were in executive positions, either as the owner of the firm, or as a director, while managerial level positions were indicated by 13 percent of participants, with only 3 percent identifying their positions as technical.

Figure 4.18: Position of Respondents



Given that the questionnaire was to be completed by the owner of the company or by an executive who was directly involved in strategic decision-making, Figure 4.18 displays results of a sample which is strongly representative of the population the questionnaires were sent to.

4.9 Concluding Remarks

This chapter addressed the research design, methodology and implementation of this study. In order to answer the research questions, it was deemed that a quantitative approach provides the necessary scope for the empirical test of an integrative theoretical framework and hypotheses, developed in Chapter 3.

Starting from a brief review of distinct philosophical perspectives on social research discussed, the research philosophy of this thesis is positioned within the critical realist perspective, as representing the most appropriate foundation from which the methodological choices for this investigation were made. The chapter explored the survey method chosen as well as the design, pilot test, and implementation of the research instrument, a self-administered mail questionnaire. The statistical techniques chosen for data analysis are also defined. The results of the empirical part of this study are presented in the following Chapters 5, 6 and 7.

Chapter 5: The Determinants of Exports by Software Firms

5.1 Introduction

This chapter outlines the main empirical findings from the mail questionnaire survey in regard to the determinants of exports, chosen as one of the dependent variables of the study to measure Brazilian software firms' internationalisation.

For the purpose of testing the hypotheses set forth in Chapter 3, logistic regression analyses are applied, examining the combined effect of factors related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study on the propensity of software firms to export.

In Section 5.2, the results of the logistic regression models developed for the overall sample are discussed and the test of the hypotheses of the study is provided. The section also presents an overview of the results across all the logistic models, leading to the identification of determinant factors that significantly impact the exports of Brazilian software firms. In Section 5.3, the results of logistic regression models are displayed for two sample sub-groups, smaller firms and larger firms. Section 5.4 closes the chapter with a short summary.

5.2 Analysis of the Overall Sample

The statistical analyses of the empirical data were all entered in Statistica version 7.0. An alpha level of significance of 10 percent was used for all statistical tests in order to meet the requirements for an acceptable analysis. To determine an adequate alpha level for the application of regression analyses in this research, given the relatively small sample size ($N=148$), the researcher considered the guidelines for achieving an acceptable level of statistical power, i.e., the probability of detecting any statistically significant relationship and the generalizability of the result (Hair et al., 2006).

Using the power of the statistical inference test, the researcher considered a simultaneous balance between the alpha level, sample size, and effect size to achieve the minimum acceptable power level of 80 percent, as proposed by Cohen (1988). The researcher therefore calculated a medium effect size (effect sizes of 0.2, 0.5, and 0.8 are considered small, medium, and large, respectively) with the actual sample of 148 firms to reach the desired level of 80 percent power. The results of the power analysis calculations indicate that for an alpha level of 0.10, the power obtained was 0.92, providing more than satisfactory statistical power for the proposed regression analyses. Therefore, the consideration above justifies the less restrictive alpha level that was chosen.

The selection of the explanatory variables to predict the dependent variable of exports, as outlined in Chapters 3 and 4, is justified by the review of the literature that led to the development of this study's integrative

theoretical framework, from which a set of hypotheses was developed and empirically tested.

The choice of logistic regression as the main data analysis technique for this research is explained by its robustness, flexibility and less restrictive assumptions in that it is formulated to predict and explain a dichotomous dependent variable, incorporating nominal, ordinal, ratio, or interval variables and nonlinear effects as well as a wide range of statistical measures (Hair et al., 2006). For the logistic regression analyses, the dependent variable of exports was used as a dummy variable where firms with a percentage of foreign sales different than 0.00 in 2005 were coded “1” and “0” otherwise.

As indicated in Chapter 4, in order to overcome problems of inconsistency in the estimates of the logistic models for exports, due to missing values in the sample data, some constructs of the theoretical framework had to be excluded from further analysis (see Section 4.7). Thus the constructs of *External Constraints for International Operations*; *Trust*; *Commitment*; *Capabilities of Partners*; and *Interdependence between Partners* have been dropped out in the logistic regression analyses.

Although only multivariate techniques are appropriate to analyse the interrelationships between all the explanatory variables of the study simultaneously (Hair et al., 2006; Corrar et al., 2007), the researcher had to choose an alternative technique for analysis to address this problem, undertaking separate bivariate analyses with the use of Spearman's Correlation Rank Tests. The objective was to examine the effect of each of the five individual constructs, as explanatory variables of the study, on exports. Spearman's Correlation Rank Tests can be used when data are not

normally distributed, which is the case in this study (see Section 4.7). They are considered appropriate for the interpretation of the magnitude and strength of the associations between two variables, in other words, when the behaviour of one affects the behaviour of the other (Gibbons, 1993). This measure also allows for the test of the statistical significance of the associations.

The Spearman's Correlation Rank Tests were conducted with the dependent variable of exports measured as a ratio variable, as in its original form in the survey questionnaire. For more detail on the operationalisation of the dependent variable of exports, see Section 4.6.1. The results of the bivariate analyses testing the associations between the five constructs which had to be excluded from the logistic regression analyses and the dependent variable of exports are summarised in Table 5.1, and will be discussed in the next section.

Table 5.1: Spearman Correlation of Selected Constructs and Exports

Construct	Spearman Rho	<i>p</i>
External Constraints for International Operations	-0.31	0.03
Trust	-0.05	0.67
Commitment	0.05	0.70
Capabilities of Partners	-0.05	0.70
Interdependence between Partners	0.21	0.09

The remaining constructs *Institutional Connectedness*; *Geographical Concentration of Firms*; *Participation in Business Networks*; *Governance Mechanisms*; *Collaboration with Foreign Partners*; *Networking Competences*;

Technological Capabilities; International Entrepreneurial Orientation; International Experiential Knowledge; and the variables of Size of Firm; Age; Education; Experience; and Language Skills as well as the control variables - *Firm Age; Outsourcing; Bespoke Software; Customised Software; Packaged Software; and Embedded Software*, indicating the “Areas of Activity” of software firms- have been subjected to further examination as possible determinants of exports through the application of logistic regression analyses using the maximum likelihood estimation method.

5.2.1 Assessment of Logistic Models of the Overall Sample

Using the overall sample (n=148), this section presents the results of the assessment of the five logistic regression models (Table 5.2), each with different sets of explanatory variables related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study, with all used to test the research hypotheses about their effect on the outward aspect of internationalisation – exports - one of the two dependent variables of this study. Missing cases were negligible and varied between 2 to 4 cases per model.

Agresti (2002) and Hair et al. (2006) suggest that for small to moderate size samples, the Likelihood Ratio Test is generally more reliable than the Wald Test as a measure of overall model fit. Thus, although the Wald Chi-Square Test was run and its results are shown in all the regression models reported in this section, the Likelihood Ratio Test is deemed a more appropriate statistic to make statistical inferences about the parameter estimates given this study’s sample size.

According to Peng et al. (2002) the soundness of a logistic regression model should be evaluated in four distinct ways in regard to: (1) overall fit; (2) statistical significance of individual regression coefficients (i.e. β s); (3) goodness-of-fit statistics; and (4) classification of the validity of predicted probabilities. Thus, several statistics are provided in Table 5.2 for the assessment of the overall fit and goodness-of-fit of the five logistic models estimated for the overall sample. A descriptive account of the five logistic models, the results of the Log-likelihood values and the statistical tests of Likelihood Ratio, Hosmer and Lemeshow Goodness-of-Fit, and Model R^2 and *Adjusted R^2* ²³ as well as measures of the validity of predicted probabilities of each model will be discussed next.

Model 1 provides results testing the impact of the explanatory variables related to the contextual dimension on exports: the constructs *Institutional Connectedness*, and *Geographical Concentration of Firms*. The construct *External Constraints for International Operations* (questions B13_1 to B13_16 of the survey questionnaire), as discussed in the previous section, was dropped for the logistic regression analysis because of missing values in the constructs whose formation depended on variables of the block B of the survey questionnaire. The intercept of the model ($\mu = -3.28$, $p < 0.01$) was negative, indicating that firms are more likely not to export than to export. The initial value of the log-likelihood statistic was 133.47. The likelihood ratio value is significant (7.15, $p < 0.05$) and demonstrates an improvement of Model 1 over the intercept-only model, rejecting the null hypothesis that all

²³*Adjusted R^2* is a measure that minimizes in a systematic way the impact of the increase in the number of independent variables relative to the sample size, addressing the level of overfitting to the R^2 achieved by the model. It is particularly useful in regression models using different number of independent variables (Hair et al., 2006, p. 216).

the coefficients associated with the explanatory variables have a value of zero.

The inferential goodness-of-fit test of Hosmer and Lemeshow provides a comprehensive measure of predictive accuracy of the model, with a non-significant value ($\chi^2=4.68$, $p>0.10$) for Model 1 indicating that the model fit is acceptable. Supplementary to the Hosmer and Lemeshow test, the R^2 and *Adjusted R²* measures show a starting value of 0.077 and 0.045, respectively, against which the addition of explanatory variables in Models 2, 3, 4, and control variables in Model 5 will be compared in terms of improvement in predictive efficiency of the models. The classification matrix of this model showed a sensitivity of 100% (it correctly predicts firms that export) and a specificity of 0% (it correctly predicts firms that do not export).

Model 2 gives the results of testing the influence of the explanatory variables related to the network dimension on exports: the constructs *Participation in Business Networks*; *Governance Mechanisms*; and *Collaboration with Foreign Partners*. The constructs *Trust*, *Commitment*, *Capabilities of Partners*; and *Interdependence between Partners* (questions C12_1 to C12_7; C12_12 to C12_14; C12_15 to C12_19; and C5_1 to C5_5 of the survey questionnaire, respectively) were omitted because of missing values in the constructs whose formation depended on variables of the block C of the survey questionnaire. The intercept of the model was also negative ($\mu = -3.25$, $p<0.01$), indicating that firms are more likely not to export than to export. The value of the log-likelihood statistic of Model 2 was 121.30 at a $p=0.007$, indicating that the addition of the three explanatory variables related to the network dimension factors represented a statistically significant

improvement in the model's ability to predict the dependent variable of exports in comparison to the previous model. Model 2 also displays a highly significant likelihood ratio value (19.31, $p < 0.01$), a very good indicator of rejection of the null hypothesis, showing an improvement over the intercept-only model.

The result of the Hosmer and Lemeshow test ($\chi^2 = 11.63$, $p > 0.10$) indicates that the goodness-of-fit of Model 2 is satisfactory. The R^2 and *Adjusted R²* have both increased to 0.199 and 0.122, respectively, showing that the addition of the explanatory variables related to the network dimension in Model 2 made an increment in the predictive accuracy of the model. The model correctly predicts 99.17% of firms that export, while it correctly predicts only 14.81% of firms that do not export.

Model 3 displays the results of testing the impact of the explanatory variables related to the organisational dimension on exports: *Size of Firm*; *Networking Competences*; *Technological Capabilities*; *International Entrepreneurial Orientation*; and *International Experiential Knowledge*. Similarly to Models 1 and 2, the intercept of model 3 was also negative ($\mu = -7.64$, $p < 0.01$). The value of the log-likelihood statistic of Model 3 was 100.48 at a $p = 0.001$, indicating that the addition of the five explanatory variables related to the organisational dimension factors contributed to a highly significant improvement in the model's ability to predict exports in comparison to Model 2. The model shows a highly significant likelihood ratio value of 40.14 ($p < 0.01$), thus demonstrating an improvement over the intercept-only model. Thus the null hypothesis is rejected.

The Hosmer and Lemeshow goodness-of-fit result with a non-significant value ($\chi^2=10.01$, $p>0.10$) indicates that the model fit is acceptable. The R^2 and *Adjusted R²* have both increased, to 0.387 and 0.238, respectively, showing that the addition of the explanatory variables related to the organisational dimension in Model 3 made an increment in the predictive accuracy of the model. In comparison with Model 2, the model showed a slightly lower sensitivity (97.52%). On the other hand, the specificity of 33.33% shows an increase in the percentage of correctly predicted firms that do not export.

Model 4 provides the results of testing the effect of the explanatory variables related to the entrepreneur dimension on exports: *Age*; *Education*; *Experience*; and *Language Skills*, completing the four sets of explanatory variables of the integrative theoretically-derived framework, while the full model - *Model 5* - includes the control variables of the study: *Firm Age*; *Outsourcing*; *Bespoke Software*; *Customised Software*; *Packaged Software*; and *Embedded Software*, as the “*Areas of Activity*” of software firms. The model thus accounts for all main effects and all possible interrelationships of the explanatory variables. Model 4 has a highly significant likelihood ratio value (46.96, $p<0.01$) showing an improvement of the model over the intercept-only model ($\mu = -8.36$, $p<0.05$). The value of the log-likelihood statistic of Model 4 was 85.97 at a $p=0.006$, indicating that the addition of the four explanatory variables related to the entrepreneur dimension factors provided a further and statistically significant improvement in the model’s ability to predict exports in comparison to Model 3.

The result of the application of the Hosmer and Lemeshow test to Model 4 indicates a good model fit with a non-significant value ($\chi^2=3.09$, $p>0.10$). In addition, in comparison to Models 1, 2, and 3, the R^2 and *Adjusted R²* show also an increase in the predictive accuracy of the model, with values of 0.462 and 0.278, respectively. Model 4 correctly predicts 97.48% of firms that export, while it correctly predicts 44.00% of firms that do not export, percentages that are slightly lower and higher, respectively, compared with Model 3.

Similarly to the previous models, the intercept of the full model (Model 5) was also negative ($\mu = -10.22$, $p<0.05$), indicating that firms are more likely not to export than to export. Although the value of the full model's log-likelihood statistic (76.75) decreased in comparison with Model 4, the addition of the control variables showed no significant contribution to a further improvement in the explanatory power of the full model ($p=0.161$). The likelihood ratio value shows that the full model is highly significant (55.41, $p<0.01$), a sign of improvement over the intercept-only model.

Also, the Hosmer and Lemeshow test applied to the full model indicates a good model fit with a non-significant value ($\chi^2=4.60$, $p>0.10$). The results of the R^2 and *Adjusted R²* measures of 0.533 and 0.323, respectively, show a further increase in the predictive accuracy of the model. The classification matrix of this model showed a sensitivity of 96.58% (it correctly predicts firms that export) and a specificity of 48.00% (it correctly predicts firms that do not export).

Overall, the full model shows substantial improvements over Models 1, 2, 3, and 4 in both the statistically based measures of overall model fit and

the classification accuracy. Finally, the full model corroborates or refutes the findings of the previous logistic models in the explanation of the key determinants which conjointly affect the propensity of software firms to export.

Table 5.2 summarises the results of the logistic regression analyses that were performed using the overall sample, associating the likelihood of exports, as the dependent variable, to different sets of explanatory variables related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study.

Table 5.2: Determinants of Exports: Logistic Regression Results

Dependent Variable:	Exports				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Contextual Factors	Network Factors	Organisational Factors	Entrepreneur Factors	Full Model
Intercept	-3.28*** (0.77)	-3.25*** (0.86)	-7.64*** (2.24)	-8.36** (3.53)	-10.22** (4.14)
Explanatory Variables					
Contextual Dimension					
Institutional Connectedness	0.36** (0.15)	0.26 (0.17)	0.19 (0.2)	0.22 (0.22)	0.13 (0.24)
Geographical Concentration of Firms	0.52 (0.45)	0.36 (0.49)	0.40 (0.58)	0.76 (0.65)	0.89 (0.72)
Network Dimension					
Participation in Business Networks	-	0.97* (0.55)	1.19** (0.61)	1.33** (0.68)	1.56** (0.78)
Collaboration with Foreign Partners	-	-0.01* (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)
Governance Mechanisms	-	-0.09 (0.18)	-0.04 (0.21)	-0.05 (0.24)	0.02 (0.24)
Organisational Dimension					
Size of Firm	-	-	0.34** (0.17)	0.27 (0.18)	0.49* (0.25)
Networking Competences	-	-	0.00 (0.37)	0.24 (0.41)	0.24 (0.46)
Technological Capabilities	-	-	0.02 (0.01)	0.01 (0.02)	0.01 (0.02)
International Entrepreneurial Orientation	-	-	0.84*** (0.32)	0.76** (0.34)	0.87** (0.38)
International Experiential Knowledge	-	-	-0.40* (0.22)	-0.30 (0.26)	-0.17 (0.31)
Entrepreneur Dimension					
Age	-	-	-	-0.17 (0.45)	-0.24 (0.53)
Education	-	-	-	-0.16 (0.58)	-0.20 (0.64)
Experience	-	-	-	-0.07 (0.05)	-0.10 (0.07)
Language Skills	-	-	-	0.67 (0.43)	0.81 (0.51)
Control Variables					
Firm Age	-	-	-	-	-0.03 (0.06)
Areas of Activity	-	-	-	-	-0.30 (0.83)
-Outsourcing	-	-	-	-	0.77 (0.82)
-Bespoke software	-	-	-	-	-1.13 (0.73)
-Customised software	-	-	-	-	1.10 (0.79)
-Packaged software	-	-	-	-	1.54* (0.84)
-Embedded software	-	-	-	-	
Cases in analysis	148	148	148	144	142
Log-likelihood	133.47	121.30	100.48	85.97	76.75
Likelihood Ratio	7.15**	19.31***	40.14***	46.96***	55.41***
Wald Chi-Square	6.45**	11.54**	23.11**	23.20*	23.03
Hosmer and Lemeshow					
Goodness-of-Fit	4.68	11.63	10.01	3.09	4.60
Model R ²	0.077	0.199	0.387	0.462	0.533
Adjusted R ²	0.045	0.122	0.238	0.278	0.323

Notes: *p<0.10; **p<0.05, ***p<0.01 (standard errors in parenthesis). Figures in the table are beta (β) coefficients.

5.2.2 Hypotheses Testing

In this section, the results of the logistic regression analyses using the maximum likelihood method to examine the hypothesised effects of several determinants of exports by Brazilian software firms are discussed. The test of the hypotheses related to *Contextual Dimension* factors is provided in Model 1; *Network Dimension* factors in Model 2; *Organisational Dimension* factors in Model 3; and *Entrepreneur-related Dimension* factors in Model 4. Model 5 shows all four sets of explanatory and control variables. The estimated beta coefficients (β) for each of the explanatory and control variables in the five models are provided in Table 5.2. The direction and magnitude of the impact of each of the study's explanatory variables on exports are assessed by the beta coefficients (β) and by the exponentiated coefficients (odds ratio) respectively.

Hypotheses related to Contextual Dimension Factors

Hypothesis 1 anticipated a positive association between the institutional connectedness of a firm and the likelihood of its internationalisation. As expected, the results of Model 1 show that institutional connectedness is statistically significant and positively related to exports ($\beta=0.36$, $p<0.05$), the outward element of internationalisation measured in this study. The odds ratio for institutional connectedness was 1.433, indicating that firms with connections and co-ordination mechanisms with institutional actors in the context where they operate tended to be more

likely to export compared to firms with no institutional connections. Thus hypothesis 1 is supported.

Hypothesis 2 expected a positive association between the geographical concentration of firms and the likelihood of firm's internationalisation. The results of Model 1 show that while firms located in geographical proximity to one another tended to be more likely to export (odds ratio of 1.682), the positive effect of geographical concentration of firms was not significant ($\beta=0.52$, $p>0.10$). Thus hypothesis 2 was not supported.

Hypothesis 3 anticipated a negative association between the perceived external constraints for international operations by a firm and the likelihood of its internationalisation. As explained in earlier sections of this chapter, in order to analyse the effects of the perceived external constraints for international operations by a firm on exports, a Spearman Correlation Rank Test was applied for testing this hypothesis. The result of the Spearman's Correlation Rank test shown in Table 5.1 indicates that the perceived external constraints for international operations are statistically significant and negatively related to the dependent variable of exports (Spearman Rho = -0.31, $p<0.05$), as suggested, and hypothesis 3 is supported.

Hypotheses related to Network Dimension Factors

Hypothesis 4 expected a positive association between the participation of a firm in business networks and the likelihood of its internationalisation. The results of Model 2 show that the participation of a

firm in business networks is statistically significant and positively related to exports ($\beta=0.97$, $p<0.10$). The odds ratio for participation in business networks was 2.638, indicating that firms with participation in business networks were more than twice as likely to export compared to firms with no business network participation. Hence hypothesis 4 is fully supported.

Hypothesis 5 proposed a positive association between the collaboration of a firm with foreign partners and its internationalisation. In this case, the results of Model 2 indicate that collaboration with foreign partners is statistically significant, however, contrary to expectations, the effect is of the opposite nature ($\beta=-0.01$, $p<0.10$). The odds ratio of collaboration with foreign partners was 0.990, indicating that firms in collaboration with foreign partners were less likely to export compared to firms with no collaboration with such partners. Therefore, hypothesis 5 is partially supported. This negative association is counter to the hypothesised association and will be examined further in the final chapter of the thesis.

Hypotheses 6a, 6b and 6c suggest that, respectively, trust, commitment, and capabilities of partners perceived as important factors in business networks by a firm are positively associated with the likelihood of its internationalisation. As explained in earlier sections of this chapter, in order to analyse the effects of trust, commitment, and capabilities of partners on exports, a Spearman Correlation Rank Test was applied for testing these hypotheses. The results of the Spearman's Correlation Rank test shown in Table 5.1 indicate that for trust and capabilities of partners, contrary to expectations, the associations with exports are negative and not statistically significant (Spearman Rho = -0.05, $p>0.10$; and Spearman Rho = -0.05,

$p > 0.10$, respectively). Although a positive association between commitment and exports exists, a statistically significant effect could not be verified (Spearman Rho = 0.05, $p > 0.10$). Hypotheses 6a, 6b and 6c are therefore not supported by the empirical findings.

Hypothesis 7 anticipated a positive association between interdependence between partners perceived as an important factor in business networks by a firm and the likelihood of its internationalisation. As explained before, a Spearman Correlation Rank Test was applied for testing this hypothesis with the results showing a positive and statistically significant association with exports (Spearman Rho = 0.21, $p < 0.10$), thus supporting hypothesis 7.

Hypothesis 8 expected a positive association between the existence of governance mechanisms in business networks and the likelihood of the internationalisation of a firm. The results of Model 2 show that firms that report the existence of governance mechanisms in the business networks they belong to are less likely to export (odds ratio of 0.913) and this negative association shows no statistical significance ($\beta = -0.09$, $p < 0.10$), providing no support for hypothesis 8. This negative association is counter to the hypothesised association and will be subject to further discussion in the final chapter of the thesis.

Hypotheses related to Organisational Dimension Factors

With Hypothesis 9, the positive association between the size of a firm and the likelihood of its internationalisation was investigated. Results of Model 3 denote that firms of larger size are more likely to export (odds ratio

of 1.404) and the estimated coefficient is positive and statistically significant ($\beta=0.34$, $p<0.05$), providing support for hypothesis 9.

Hypothesis 10 proposes a positive association between the networking competences of a firm and the likelihood of its internationalisation. In this case, the results of Model 3 indicate that the odds ratio of firms with networking competences corresponds to a relationship with no direction (the logarithm value of the original beta coefficient for networking competences is 1.0) and that the networking competences of a firm show no effect on exports ($\beta=0.00$, $p>0.10$). Thus hypothesis 10 was not supported.

Hypothesis 11 anticipated a positive association between the technological capabilities of a firm and the likelihood of its internationalisation. The results of Model 3 suggest that while firms with technological capabilities tended to be more likely to export (odds ratio of 1.020), the positive effect of the technological capabilities of a firm was not significant ($\beta=0.02$, $p>0.10$). Thus hypothesis 11 was not supported.

In accordance with Hypothesis 12 that relates to the positive association between the international entrepreneurial orientation of a firm and the likelihood of its internationalisation, the results of Model 3 show a positive and statistically highly significant association between the international entrepreneurial orientation of a firm and exports ($\beta=0.84$, $p<0.01$). The odds ratio for the international entrepreneurial orientation of a firm was 2.316, indicating that firms with international entrepreneurial orientation were more than twice as likely to export compared to firms with no international entrepreneurial orientation. Hence hypothesis 12 is fully supported.

In Hypothesis 13 a negative association was expected between the lack of international experiential knowledge, perceived as a limitation by a firm, and the likelihood of its internationalisation. The results of Model 3 indicate a negative and statistically significant association between the lack of international experiential knowledge, perceived as a limitation by a firm, and exports ($\beta=-0.40$, $p<0.05$), with firms that perceived international experiential knowledge as a limitation being less likely to export than firms that did not (odds ratio of 0.670), supporting hypothesis 13.

Hypotheses related to Entrepreneur Dimension Factors

Hypotheses 14a, 14b, 14c and 14d suggest that, respectively, the age, education, experience, and language skills of the entrepreneur of a firm are positively associated with the likelihood of its internationalisation. Contrary to expectations, the odds ratios for age (0.433), education (0.843), and experience (0.932) indicated that firms with older entrepreneurs, having higher levels of formal education, and with higher number of years of work in the software industry tended to be less likely to export compared to firms with younger entrepreneurs, with fewer years of education, and fewer number of years of work in the industry. Also, the results of Model 4 indicate negative and statistically insignificant coefficients for age ($\beta=-0.17$, $p>0.10$), education ($\beta=-0.16$, $p>0.10$), and experience ($\beta=-0.07$, $p>0.10$), and positive and statistically insignificant for language skills ($\beta=0.67$, $p>0.10$). Hence, hypotheses 14a, 14b, 14c and 14d are not supported.

5.2.3 Overview of Overall Sample Results

This section provides a brief analysis of the regression results of the overall sample across Models 1 to 5, provided in Table 5.2, leading to the identification of the key determinant factors that jointly impact exports of Brazilian software firms.

Taken together, the empirical findings shown in the five logistic models indicate that contextual, network, organisational and entrepreneur-related factors can explain whether software firms export. Examining the results of the regression analyses across all five models, seven explanatory variables can be identified as the most important determinant factors of exports by Brazilian software firms.

First and foremost, at the network dimension, the effect of participation in business networks on exports is empirically supported by statistical evidence across Models 2, 3 and 4, and is corroborated in Model 5 ($\beta=1.56$, $p<0.05$) as the key determinant factor in the explanation of exports by Brazilian software firms.

The second most important determinant of exports by Brazilian software firms is the international entrepreneurial orientation of a firm, an organisational factor that is statistically supported across Models 3 and 4, and is corroborated in Model 5, showing a positive and significant coefficient ($\beta=0.87$, $p<0.05$).

The third most important determinant of exports by Brazilian software firms is the size of a firm, an organisational factor that shows positive and

statistically significant coefficients in Model 3, discussed in the previous section, and in Model 5 ($\beta=0.49$, $p<0.10$).

The results of the logistic regression analyses of the overall sample also show that other determinant factors of exports by Brazilian software firms are the institutional connectedness of a firm, a contextual factor; collaboration with foreign partners, and international experiential knowledge perceived as a limitation by a firm, network and organisational factors, respectively. Model 5, the full model, shows that the control variable of “embedded software”, as an area of activity of a firm, is positively and statistically associated with exports by Brazilian software firms ($\beta=1.54$, $p<0.05$). Further, “embedded software” as an area of activity of a firm increases more than four times the likelihood of exports by software firms (odds ratio of 4.664). Finally, the beta coefficient estimates of collaboration with foreign partners (shown in Model 2) and international experiential knowledge (shown in Model 3) become statistically non-significant when considered with all variables in the logistic regression analysis provided in Model 5.

5.3 Analysis of Sample Sub-Groups

In addition to the overall sample analysis provided in the previous section, the researcher performed a split-sample analysis where the differential effects of factors related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study on the propensity of software firms to export are

examined on two sub-groups. The results of separate regression analyses are reported in Table 5.3.

Before discussing the results, however, it is necessary to describe the process by which the choice of sub-groups for further logistic regression analyses was made. In order to estimate logistic regression models for sub-groups, a series of separate logistic regression analyses were run to assess the statistical suitability of different sub-groups samples according to meaningful categories: age of firm; size of firm by number of employees; market scope; business network participation; and size of firm by revenues. The choice criteria were that each sub-group within the sample would have to comply with the ratio of observations to independent variables and, in each case, achieve also a satisfactory model convergence status in the logistic procedures of the computer-based software program utilised for the calculation of the logistic models of both exports and imports.

The assessment of the Statistica software program's logistic procedures outputs revealed that all sub-groups but one indicated problems with the validity of the models' fit. Thus, after the assessment of the statistical adequacy of several possible sub-groups samples, separate logistic regression models were estimated for two sub-groups according to the size of firm by revenues. The sub-group "smaller firms" was classified as firms that reported in the questionnaire survey annual gross revenue in the year 2004 of <R\$2 million, while the sub-group "larger firms" comprises firms that reported over R\$2 million of annual gross revenue in the same year. It is also worth noting that the variable *Size of Firm* is related to the construction

of the sub-groups' samples and for this reason was removed in each of the sub-groups' logistic regression analyses.

Given the moderately small sample size of the overall sample (148 firms), issues of sample size had to be considered for the planned analysis of sub-groups. Thus, in order to meet the recommended minimum 5:1 observation-to-predictor ratio (Hair et al., 2006), the control variables belonging to *Areas of Activity* were removed in each of the sub-group samples. As a consequence, the "smaller firms" sub-group sample's ratio (7:1) exceeds the threshold value of 5:1 in the Full Model displayed in Table 5.3, with all sets of explanatory variables of the theoretical framework included. Although the "larger firms" sub-group sample's ratio falls below the threshold ratio in the Full Model (3.6:1) of the logistic analyses, it was deemed more important to keep the explanatory variables of the theoretical framework for assessment reasons, rather than removing any further variables of the logistic models.

Following the case of the overall sample, for the same reasons explained earlier in this chapter, the constructs *External Constraints for International Operations*; *Trust*; *Commitment*; *Capabilities of Partners*; and *Interdependence between Partners* were also excluded in the logistic regression models estimated for each of the sub-groups samples. The "smaller firms" sub-group sample consisted of 98 companies and the "larger firms" sub-group sample consisted of 50 companies. For the sake of brevity, the discussion of the sample sub-groups' regression results is limited to the explanatory variables that show significant beta coefficient estimates in each of the two sub-groups. Also, examining the results of the five logistic models

for each sample sub-group shown in Table 5.3, a comparison of the determinants of exports between smaller and larger firms is provided.

Table 5.3: Determinants of Exports: Logistic Regression Results by Sub-Groups

Dependent Variable:	Exports									
	Smaller Firms					Larger Firms				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Contextual Factors	Network Factors	Organisational Factors	Entrepreneur Factors	Full Model	Contextual Factors	Network Factors	Organisational Factors	Entrepreneur Factors	Full Model
Intercept	-2.83*** (1.01)	-3.37*** (1.23)	-9.19*** (3.28)	-5.66 (4.83)	-8.21 (6.00)	-3.10** (1.33)	-2.82* (1.50)	-3.40 (3.58)	-16.12** (7.55)	-16.09** (7.58)
Explanatory Variables										
Contextual Dimension										
Institutional Connectedness	0.21 (0.21)	0.08 (0.24)	-0.04 (0.27)	0.07 (0.32)	0.02 (0.34)	0.40* (0.24)	0.34 (0.26)	0.40 (0.37)	0.54 (0.50)	0.52 (0.51)
Geographic Concentration of Firms	-0.35 (0.69)	-0.10 (0.73)	0.26 (0.84)	0.46 (1.04)	0.03 (1.10)	1.10 (0.68)	0.73 (0.76)	0.74 (0.97)	1.63 (1.68)	1.53 (1.76)
Network Dimension										
Participation in Business Networks	-	1.58* (0.89)	2.03* (1.00)	1.66 (1.08)	1.79 (1.11)	-	0.61 (0.82)	0.54 (0.98)	0.22 (1.34)	0.30 (1.41)
Collaboration with Foreign Partners	-	0.21 (0.21)	0.30 (0.26)	0.21 (0.28)	0.24 (0.29)	-	-0.01 (0.00)	0.01 (0.00)	-0.01 (0.00)	-0.01 (0.00)
Governance Mechanisms	-	0.05 (0.28)	-0.01 (0.28)	-0.06 (0.33)	-0.05 (0.34)	-	-0.13 (0.27)	0.02 (0.33)	-0.11 (0.50)	-0.14 (0.52)
Organisational Dimension										
Networking Competences	-	-	0.55 (0.52)	0.52 (0.54)	0.64 (0.61)	-	-	-0.94 (0.78)	-1.22 (1.33)	-1.16 (1.35)
Technological Capabilities	-	-	0.03* (0.02)	0.02 (0.02)	0.02 (0.02)	-	-	0.00 (0.03)	-0.02 (0.05)	-0.02 (0.05)
International Entrepreneurial Orientation	-	-	0.61 (0.42)	0.48 (0.46)	0.48 (0.47)	-	-	1.46** (0.59)	2.82** (1.21)	2.81** (1.20)
International Experiential Knowledge	-	-	-0.19 (0.29)	-0.08 (0.39)	0.00 (0.41)	-	-	-0.75 (0.49)	-1.76 (1.07)	-1.83 (1.14)
Entrepreneur Dimension										
Age	-	-	-	-0.84 (0.75)	-0.88 (0.78)	-	-	-	1.90 (1.33)	2.02 (1.50)
Education	-	-	-	-0.38 (0.89)	-0.12 (0.98)	-	-	-	1.44 (1.46)	1.42 (1.45)
Experience	-	-	-	-0.06 (0.10)	-0.11 (0.11)	-	-	-	-0.31* (0.16)	-0.33* (0.19)
Language Skills	-	-	-	0.74 (0.82)	0.90 (0.86)	-	-	-	0.75 (0.96)	0.73 (0.97)
Control Variable										
Firm Age	-	-	-	-	0.13 (0.14)	-	-	-	-	0.02 (0.08)
Cases in analysis	98	98	98	95	93	50	50	50	49	49
Log-likelihood	72.19	68.07	54.02	48.72	45.87	52.40	48.27	37.32	0.19	0.12
Likelihood Ratio	1.45	6.74	16.71*	17.09	17.62	4.87*	8.91	21.47**	35.02***	35.06***
Wald Chi-Square	1.40	5.24	11.04	9.52	9.58	4.15	5.57	9.84	9.08	8.90
Hosmer and Lemeshow	8.16	10.99	2.94	6.13	4.99	3.08	8.58	4.47	5.18	5.09
Goodness-of-Fit	0.030	0.138	0.325	0.354	0.367	0.129	0.226	0.483	0.712	0.713
Model R ²	0.014	0.067	0.157	0.165	0.173	0.093	0.163	0.349	0.511	0.511

Notes: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$ (standard errors in parenthesis). Figures in the table are beta (β) coefficients.

The results of the logistic regressions of the split sample analyses demonstrate that there are clear differences between the two samples. The findings suggest that contextual, network, organisational, and entrepreneur-related factors exhibit different effects on the likelihood of exports for smaller and larger firms in the Brazilian software industry.

The regression results in Table 5.3 show that factors related to both the network and the organisational dimensions significantly impact the exports of smaller Brazilian software firms. First, the results of Model 1 show that participation in business networks has a positive and statistically significant impact on the likelihood of exports in smaller software firms ($\beta=1.58$, $p<0.10$). Smaller firms that participate in business networks are almost five times more likely to export than those that do not (odds ratio of 4.854).

The critical importance participation in business networks for the explanation of exports in smaller software firms is further corroborated in Model 3, which shows a significant and positive coefficient for this factor ($\beta=2.03$, $p<0.10$). With the combined effect of organisational factors, as shown in Model 3, the participation of smaller firms in business networks increase more than seven times the likelihood of exports by smaller firms (odds ratio of 7.614). These results therefore suggest that participation in business networks is the most important determinant factor in the explanation of exports by smaller Brazilian software firms.

Second, as can be observed in Model 3 of the smaller firms' sample sub-group (Table 5.3), the coefficient of the technological capabilities of a

firm, a factor related to the organisational dimension, is positive and significant ($\beta=0.03$, $p<0.10$), with smaller firms that have technological capabilities being more likely to export than firms that do not (odds ratio of 1.030). Thus, combined in Model 3, the participation in business networks and the technological capabilities of a firm are the two most important determinants of exports by smaller Brazilian software firms.

It is also worth mentioning that the examination of the results of the overall statistics and statistical tests of the five logistic models calculated for the smaller firms' sample sub-group demonstrates that Model 3, including the network and organisational factors, is the best fitting model. The likelihood ratio of the model was significant (16.71, $p<0.10$) and the value of the log-likelihood statistic of Model 3 was 54.02 at a $p=0.015$, the most highly significant among the other logistic models of this sub-group sample, showing that the addition of the five organisational variables added explanatory power to the model.

In contrast, the results of Table 5.3 show that a distinct set of factors have significant impact on the exports of larger Brazilian software firms such that contextual, organisational, and entrepreneur-related determinants can explain exports of this group of firms. Looking at contextual factors, the institutional connectedness of larger software firms is positively and significantly associated with exports ($\beta=0.40$, $p<0.05$), as the results in Model 1 show, with larger firms that have institutional connections being more likely to export than larger firms that have no institutional connections (odds ratio of 1.492).

The results in Model 3, in which organisational factors are included, indicate that international entrepreneurial orientation is positively and significantly associated with exports of larger software firms ($\beta=1.46$, $p<0.05$) and that having an entrepreneurially and internationally-oriented behaviour increases more than four times the likelihood of exports by larger Brazilian software firms (odds ratio of 4.305).

The results of Model 4 of the larger firms' sub-group sample (Table 5.3) corroborate the importance of the international entrepreneurial orientation of a firm as a factor explaining exports of larger Brazilian software firms ($\beta=2.82$, $p<0.05$) and show an increase of more than sixteen times in the likelihood of exports by larger Brazilian software firms (odds ratio of 16.776). Among the entrepreneur variables, an unpredicted negative and statistically significant association appears between the experience of the entrepreneur in larger firms and exports ($\beta=-0.31$, $p<0.10$).

In Model 5 of the larger firms' sub-group sample, the full model in which the four sets of explanatory and control variables are simultaneously tested, the international entrepreneurial orientation of a firm again displays a positive and significant effect on exports by larger Brazilian software firms ($\beta=2.81$, $p<0.05$), while also the negative and statistically significant association between the experience of the entrepreneur in larger firms and exports is corroborated ($\beta=-0.33$, $p<0.10$).

The results of the overall statistics and statistical tests of the five logistic models calculated for the larger firms' sample sub-group show that Model 4, including the four sets of explanatory variables, is the best fitting

model, with the most highly significant log-likelihood value (0.19 at a $p=0.000$) among the models and a highly significant likelihood ratio (35.02, $p<0.01$).

5.4 Concluding Remarks

This chapter has reported the results of the main empirical data of this study, aiming at identifying the determinants of exports by Brazilian software firms. For the purpose of inferential analyses, logistic regressions were conducted to test a set of hypotheses examining the effects of factors related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study as determinants of exports, an outward element of internationalisation, by Brazilian software firms. Using several statistical measures, the assessment of the logistic models suggest that parsimonious models were created in this research, combining good predictors of exports.

The results of the logistic regression models developed for the overall sample as well as for the two sample sub-groups classified into smaller firms and larger firms led to the identification of determinant factors that significantly impact exports by Brazilian software firms. Based on the regression results shown in the five logistic models of the overall sample, it can be noted that seven factors emerge as the most important determinants in the explanation of exports by Brazilian software firms. Ranked by order of significance, these factors are: participation in business networks; international entrepreneurial orientation; size of a firm; institutional

connectedness; collaboration with foreign partners; international experiential knowledge; and embedded software as an area of activity of a firm.

If the logistic regression results of smaller firms and larger firms are analysed separately, a distinct set of determinants appear in each of the sub-group samples. It has been demonstrated that the participation in business networks and technological capabilities - network and organisational factors respectively - significantly impact the exports of smaller Brazilian software firms. In contrast, institutional connectedness, international entrepreneurial orientation and experience of entrepreneur - contextual, organisational and entrepreneur-related factors respectively - are the most significant determinants of exports by larger Brazilian software firms.

The findings of this chapter and their implications, together with the findings reported in the next Chapter 6, are discussed in the final chapter of the thesis.

Chapter 6: The Determinants of Imports by Software Firms

6.1 Introduction

This chapter examines the main empirical findings in regard to the determinants of imports, one of the two dependent variables chosen to measure the internationalisation of Brazilian software firms in the study. It follows the approach adopted for the analysis of the determinants of exports in the previous chapter²⁴. To test the hypotheses of the theoretical framework formulated in Chapter 3, logistic regressions are used for the examination of the combined effect of factors related to the contextual, network, organisational and entrepreneurial dimensions on the propensity of software firms to import.

In Section 6.2, the results of the logistic models developed for the overall sample are discussed and the testing of the hypotheses of the study is provided. The section also outlines the results across all the logistic models, leading to the identification of factors that significantly impact the imports of Brazilian software firms. In Section 6.3, results of logistic

²⁴ It should be noted that the researcher's approach to data analysis and the statistical issues addressed for the application of the logistic regression analysis technique in Chapter 5 are identically applied in Chapter 6, though focused on imports as the dependent variable in the latter. Thus, for the sake of brevity, these aspects are discussed more briefly in this chapter.

regression models are displayed for two sample sub-groups, smaller firms and larger firms. Concluding remarks are presented in Section 6.4.

6.2 Analysis of the Overall Sample

The statistical analyses of the empirical data reported in this chapter were all entered in Statistica version 7.0. An alpha level of significance of 10 percent was used for all statistical tests in order to meet the requirements for an acceptable analysis. As explained in more detail in Section 5.2, the less restrictive alpha level chosen is justified by the need to achieve the minimum acceptable power level of 80 percent, as proposed by Cohen (1988), given the relatively small sample size ($N=148$). In this study, the power obtained was 0.92, providing more than satisfactory statistical power for the proposed regression analyses.

The selection of the relevant explanatory variables to predict the dependent variable of imports (see Chapters 3 and 4), is justified by the review of the literature that led to the development of this study's integrative theoretical framework, from which a set of hypotheses was developed and empirically tested. Logistic regression analysis is the main data analysis technique of this research with which the investigation of the determinants of imports was carried out. For the logistic regression analyses, the dependent variable of imports was used as a dummy variable where firms with a percentage of supplies from abroad different than 0.00 in 2005 were coded "1" and "0" otherwise.

As indicated in previous chapters (see Sections 4.7 and 5.2), as a result of the problems of inconsistency in the estimates of the logistic models for imports, the constructs of *External Constraints for International Operations*; *Trust*; *Commitment*; *Capabilities of Partners*; and *Interdependence between Partners* have been dropped out in the logistic regression analyses of imports. To solve the problem, the researcher had to choose an alternative statistical technique undertaking separate bivariate analyses with the use of Spearman's Correlation Rank Tests. The objective was to examine the effect of each of the five individual constructs, as explanatory variables of the study, on imports. Spearman's Correlation Rank Tests are appropriate when data are not normally distributed, as is the case in this study (see Section 4.7), and are used for the interpretation of the associations between two variables (Gibbons, 1993). They make possible the test of the statistical significance of the associations.

The Spearman's Correlation Rank Tests were conducted with the dependent variable of imports measured as a ratio variable, as in its original form in the survey questionnaire. For more details on the operationalisation of the dependent variable of imports, see Section 4.6.1. The results of the bivariate analyses testing the associations between the five constructs and the dependent variable of imports are summarised in Table 6.1, and will be discussed in the next section.

Table 6.1: Spearman Correlation of Selected Constructs and Imports

Construct	Spearman Rho	<i>p</i>
External Constraints for International Operations	-0.24	0.10
Trust	-0.08	0.52
Commitment	-0.16	0.21
Capabilities of Partners	-0.24	0.05
Interdependence between Partners	0.17	0.17

The remaining constructs of *Institutional Connectedness*; *Geographical Concentration of Firms*; *Participation in Business Networks*; *Governance Mechanisms*; *Collaboration with Foreign Partners*; *Networking Competences*; *Technological Capabilities*; *International Entrepreneurial Orientation*; *International Experiential Knowledge*; and the variables of *Size of Firm*; *Age*; *Education*; *Experience*; and *Language Skills* as well as the control variables - *Firm Age*; *Outsourcing*; *Bespoke Software*; *Customised Software*; *Packaged Software*; and *Embedded Software*, indicating the “*Areas of Activity*” of software firms- have been subjected to further examination as possible determinants of imports through the application of logistic regression analyses using the maximum likelihood estimation method.

6.2.1 Assessment of Logistic Models of the Overall Sample

Using the overall sample (n=148), this section presents the results of the assessment of the five logistic regression models shown in Table 6.2,

each with different sets of explanatory variables related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study, with all used to test the research hypotheses about their effect on the inward aspect of internationalisation – imports - one of the two dependent variables of this study. Missing cases were negligible and varied between 2 to 4 cases per model.

For the assessment of the overall fit and goodness-of-fit of the five logistic regression models estimated for the overall sample, having imports as the dependent variable, the researcher followed the guidelines proposed by Agresti (2002), Peng et al. (2002) and Hair et al. (2006) In doing so, the results of the Log-likelihood values and the statistical tests of Likelihood Ratio, Hosmer and Lemeshow Goodness-of-Fit, and Model R^2 and *Adjusted R^2* as well as measures of the validity of predicted probabilities of each model were used to evaluate the soundness of the models employed in the logistic regressions discussed in this chapter.

Model 1 gives results testing the impact of the constructs *Institutional Connectedness* and *Geographical Concentration of Firms*, explanatory variables related to the contextual dimension, on imports. The intercept of the model ($\mu = 0.26$, $p > 0.10$) was positive, indicating that firms are more likely to import than to not import. The initial value of the log-likelihood statistic was 182.08. The likelihood ratio value is non-significant (1.36, $p > 0.10$) and demonstrates that Model 1 does not represent an improvement over the intercept-only model. Hence the null hypothesis that all the

coefficients associated with the independent variables have a value of zero is not rejected.

The inferential goodness-of-fit test of Hosmer and Lemeshow provides a comprehensive measure for the predictive accuracy of the model, with a non-significant value ($\chi^2=3.54$, $p>0.10$) for Model 1 indicating that the model fit is acceptable. Supplementary to the Hosmer and Lemeshow test, the R^2 and *Adjusted R²* measures show a starting value of 0.013 and 0.009, respectively, against which the addition of independent variables in Models 2, 3, 4, and 5 will be compared in terms of improvement in predictive efficiency of the models. The classification matrix of this model showed a sensitivity of 0% (it correctly predicts firms that import) and a specificity of 100% (it correctly predicts firms that do not import).

Model 2 displays the results of testing the impact of the independent variables related to the network dimension on imports: the constructs *Participation in Business Networks*; *Governance Mechanisms*; and *Collaboration with Foreign Partners*. The intercept of the model was also positive ($\mu = 0.22$, $p>0.10$), indicating that firms are more likely to import than to not import. The value of the log-likelihood statistic of Model 2 was 180.53 at a non-significant level of $p=0.672$, indicating that the addition of the three independent variables related to the network dimension did not represent a statistically significant improvement in the model's ability to predict the dependent variable of imports in comparison to the previous model. Model 2 also displays a non-significant likelihood ratio value (2.91, $p>0.10$), an

indicator that the null hypothesis of the intercept-only model, with no predictor variables, cannot be rejected.

The result of the Hosmer and Lemeshow test ($\chi^2=4.23$, $p>0.10$) indicates that the goodness-of-fit of Model 2 is satisfactory. The R^2 and *Adjusted R^2* have both increased to 0.027 and 0.019, respectively, showing that the addition of the independent variables related to the network dimension in Model 2 made a slight increment in the predictive accuracy of the model. The model shows no accuracy in correctly predicting firms that import (0%), while it correctly predicts 100% of firms that do not import.

Model 3 provides the results testing the influence of the explanatory variables related to the organisational dimension on imports: *Size of Firm*; *Networking Competences*; *Technological Capabilities*; *International Entrepreneurial Orientation*; and *International Experiential Knowledge*. Similarly to Models 1 and 2, the intercept of model 3 was also positive ($\mu=0.08$, $p>0.10$). The value of the log-likelihood statistic of Model 3 was 174.78 at a non-significant level of $p=0.331$. The model also shows a non-significant likelihood ratio value of 8.66 ($p>0.10$), thus demonstrating that the null hypothesis of the intercept-only model cannot be rejected.

The Hosmer and Lemeshow goodness-of-fit result with a non-significant value ($\chi^2=11.28$, $p>0.10$) indicates that the model fit is acceptable. The R^2 and *Adjusted R^2* have both increased to 0.080 and 0.057, respectively, showing that the addition of the explanatory variables related to the organisational dimension in Model 3 made an increment in the predictive

accuracy of the model. In comparison with Model 2, the model shows a slight improvement in the predictive accuracy of the sensitivity measure which indicates the percentage of correctly predicted firms that import (4.35%). On the other hand, the specificity of 96.08% shows a slight decrease in the percentage of correctly predicted firms that do not import.

Model 4 provides the results of testing the effect of the explanatory variables related to the entrepreneur dimension on imports: *Age*; *Education*; *Experience*; and *Language Skills*, completing the four sets of explanatory variables of the integrative theoretically-derived framework. Model 5 - the full model - includes the control variables of the study: *Firm Age*; *Outsourcing*; *Bespoke Software*; *Customised Software*; *Packaged Software*; and *Embedded Software*, as the “*Areas of Activity*” of software firms. Thus, the model accounts for all main effects and all possible interrelationships of the independent variables.

The value of the log-likelihood statistic of Model 4 was 156.48 at a $p=0.001$, indicating that the addition of the four explanatory variables related to the entrepreneur provided a statistically significant improvement in the model's ability to predict imports in comparison to Model 3. Model 4 has a non-significant likelihood ratio value (20.79, $p>0.10$) showing no improvement of the model over the intercept-only model ($\mu = 2.24$, $p>0.10$). Hence the null hypothesis cannot be rejected.

The result of the application of the Hosmer and Lemeshow test to Model 4 indicates a good model fit with a non-significant value ($\chi^2=4.63$,

$p>0.10$). In addition, in comparison to Models 1, 2, and 3, the R^2 and *Adjusted R^2* show a further increase in the predictive accuracy of the model, with values of 0.189 and 0.134, respectively. Model 4 correctly predicts 25.00% of firms that import, while it correctly predicts 92.00% of firms that do not import, percentages that are slightly higher and lower respectively, compared with Model 3.

Similarly to the previous models, the intercept of the full model (Model 5) was positive ($\mu = 1.25$, $p>0.10$), indicating that firms are more likely to import than to not import. The log-likelihood statistic of the full model is 139.63, showing a statistically significant improvement ($p=0.010$) in the explanatory power of the full model with the addition of the control variables. The statistical significance of the likelihood ratio of the full model (34.53, $p<0.05$) shows that it is the only one among the five logistic models predicting imports, using the overall sample, that represents an improvement over the intercept-only model. Thus the null hypothesis is rejected for the full model.

Also, the Hosmer and Lemeshow test applied to the full model indicates a good model fit with a non-significant value ($\chi^2=2.89$, $p>0.10$). The results of the R^2 and *Adjusted R^2* measures of 0.305 and 0.216, respectively, show a further increase in the predictive accuracy of the model. The classification matrix of this model showed a sensitivity of 41.86% (it correctly predicts firms that import) and a specificity of 89.90% (it correctly predicts firms that do not import).

The assessment of the five models shows that the full model (Model 5) provides the necessary statistical soundness and that it represents the best fit to the data among the five models analysed having imports as the dependent variable. Therefore, the full model is deemed more appropriate for testing the research hypotheses for the explanation of the key determinants which conjointly affect the propensity of software firms to import.

Table 6.2 summarizes the results of the logistic regression analyses that were performed using the overall sample, associating the likelihood of imports, as the dependent variable, to different sets of explanatory variables related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study.

Table 6.2: Determinants of Imports: Logistic Regression Results

Dependent Variable:	Imports				
	Model 1	Model 2	Model 3	Model 4	Model 5
	Contextual Factors	Network Factors	Organisational Factors	Entrepreneur Factors	Full Model
Intercept	0.26 (0.51)	0.22 (0.56)	0.08 (1.31)	2.24 (2.16)	1.25 (2.51)
Explanatory Variables					
Contextual Dimension					
Institutional Connectedness	0.09 (0.11)	0.05 (0.12)	0.01 (0.13)	0.02 (0.14)	-0.06 (0.15)
Geographical Concentration of Firms	0.33 (0.36)	0.31 (0.38)	0.26 (0.39)	0.46 (0.43)	0.09 (0.47)
Network Dimension					
Participation in Business Networks	-	0.18 (0.40)	0.23 (0.42)	0.14 (0.46)	0.37 (0.52)
Collaboration with Foreign Partners	-	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)
Governance Mechanisms	-	0.03 (0.14)	0.07 (0.14)	0.08 (0.16)	0.07 (0.17)
Organisational Dimension					
Size of Firm	-	-	0.27** (0.13)	0.41** (0.16)	0.37** (0.18)
Networking	-	-	-0.08 (0.24)	-0.03 (0.26)	0.22 (0.27)
Competences	-	-	-	-	-
Technological Capabilities	-	-	0.01 (0.01)	0.01 (0.01)	0.03* (0.02)
International Entrepreneurial Orientation	-	-	-0.03 (0.18)	-0.13 (0.2)	-0.22 (0.21)
International Experiential Knowledge	-	-	-0.03 (0.14)	0.03 (0.16)	0.08 (0.17)
Entrepreneur Dimension					
Age	-	-	-	-0.20 (0.3)	-0.22 (0.32)
Education	-	-	-	-0.14 (0.36)	-0.14 (0.40)
Experience	-	-	-	-0.08** (0.04)	-0.13*** (0.04)
Language Skills	-	-	-	0.03 (0.27)	-0.03 (0.30)
Control Variables					
Firm Age	-	-	-	-	0.14*** (0.05)
Areas of Activity	-	-	-	-	-
-Outsourcing	-	-	-	-	-0.76 (0.53)
-Bespoke software	-	-	-	-	0.40 (0.51)
-Customised software	-	-	-	-	0.28 (0.48)
-Packaged software	-	-	-	-	-0.38 (0.48)
-Embedded software	-	-	-	-	-0.07 (0.78)
Cases in analysis	148	148	148	144	142
Log-likelihood	182.08	180.53	174.78	156.48	139.63
Likelihood Ratio	1.36	2.91	8.66	20.79	34.53**
Wald Chi-Square	1.37	2.14	7.68	15.82	22.54
Hosmer & Lemeshow	3.54	4.23	11.28	4.63	2.89
Goodness-of-Fit					
Model R^2	0.013	0.027	0.080	0.189	0.305
Adjusted R^2	0.009	0.019	0.057	0.134	0.216

Notes: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$, (standard errors in parenthesis). Figures in the table are beta (β) coefficients.

6.2.2 Hypotheses Testing

In this section, the results of the logistic regression analyses using the maximum likelihood method to examine the hypothesised effects of several determinants of imports by Brazilian software firms are discussed. The test of the hypotheses of factors related to the *Contextual Dimension*, *Network Dimension*, *Organisational Dimension* and the *Entrepreneur-related Dimension* is provided in Model 5, the full model. The model shows all four sets of explanatory and control variables.

As discussed in the previous section, the choice of Model 5 with which to test the research hypotheses is justified by its statistical superiority, showing the best overall fit to the data among the five logistic models computed. The estimated beta coefficients (β) for each of the explanatory and control variables in the five logistic models are provided in Table 6.2. The direction and magnitude of the impact of each of the study's explanatory variables on imports are assessed by the beta coefficients (β) and by the exponentiated coefficients (odds ratio) respectively.

Hypotheses related to Contextual Dimension Factors

Hypothesis 1 anticipated a positive association between the institutional connectedness of a firm and the likelihood of its internationalisation. As can be seen in Table 6.2, contrary to expectations, the results of Model 5 show that the respective coefficient is negatively related to imports, the inward element of internationalisation measured in this study, with no statistical significance ($\beta=-0.06$, $p>0.10$). The odds ratio for

institutional connectedness was 0.941, indicating that firms with connections and co-ordination mechanisms with institutional actors in the context where they operate tended to be less likely to import compared to firms with no such institutional connections. Thus hypothesis 1 was not supported.

Hypothesis 2 anticipated a positive association between the geographical concentration of firms and the likelihood of firm's internationalisation. The results of Model 5 show that while firms located in geographical proximity to one another tended to be more likely to import (odds ratio of 1.094), the positive effect of geographical concentration of firms was not significant ($\beta=0.09$, $p>0.10$). Thus hypothesis 2 was not supported.

Hypothesis 3 expected a negative association between the perceived external constraints for international operations by a firm and the likelihood of its internationalisation. As explained in earlier sections of this chapter, in order to analyse the effects of the perceived external constraints for international operations by a firm on imports, a Spearman Correlation Rank Test was applied for testing this hypothesis. The result of the Spearman's Correlation Rank test shown in Table 6.1 indicates that although perceived external constraints for international operations are negatively related to imports and reached a value of $p=0.10$, they failed to attain the required alpha level of significance for this research (Spearman Rho = -0.24, $p<0.10$), and thus hypothesis 3 was not supported.

Hypotheses related to Network Dimension Factors

Hypothesis 4 expected a positive association between the participation of a firm in business networks and the likelihood of its internationalisation. The results of Model 5 show that firms that participate in business networks are more likely to import (odds ratio of 1.447). However this positive association shows no statistical significance ($\beta=0.37$, $p>0.10$). Hence hypothesis 4 is not supported.

Hypothesis 5 proposed a positive association between the collaboration of a firm with foreign partners and its internationalisation. In this case, the results of Model 5 indicate that although collaboration with foreign partners is positively associated with imports, as expected, it shows no statistical significance ($\beta=0.00$, $p<0.10$). The odds ratio of collaboration with foreign partners was 1, corresponding to a relationship with no direction. Therefore, hypothesis 5 is not supported.

Hypotheses 6a, 6b and 6c suggest that trust, commitment, and capabilities of partners, respectively, perceived as important factors in business networks by a firm are positively associated with the likelihood of its internationalisation. As explained in earlier sections of this chapter, in order to analyse the effects of trust, commitment, and capabilities of partners on imports, a Spearman Correlation Rank Test was applied for testing these hypotheses. The results of the Spearman's Correlation Rank test shown in Table 6.1 indicate that for trust and commitment, contrary to expectations, the associations with imports are negative and not statistically significant (Spearman Rho = -0.08, $p>0.10$; and Spearman Rho = -0.16, $p>0.10$,

respectively). Likewise, in the case of capabilities of partners a negative association with imports was found, but with statistical significance (Spearman Rho = -0.24, $p < 0.05$). Therefore, only Hypothesis 6c is supported.

Hypothesis 7 anticipated a positive association between interdependence between partners perceived as an important factor in business networks by a firm and the likelihood of its internationalisation. As explained before, a Spearman Correlation Rank Test was applied for testing this hypothesis with the results showing a positive but statistically non-significant association with imports (Spearman Rho = 0.17, $p < 0.10$), providing no support for hypothesis 7.

Hypothesis 8 expected a positive association between the existence of governance mechanisms in business networks and the likelihood of the internationalisation of a firm. The results of Model 5 show that firms that report the existence of governance mechanisms in the business networks they belong to are more likely to import (odds ratio of 1.072), but this positive association shows no statistical significance ($\beta = 0.07$, $p < 0.10$), providing no support for hypothesis 8.

Hypotheses related to Organisational Dimension Factors

With Hypothesis 9, the positive association between the size of a firm and the likelihood of its internationalisation was investigated. Results of Model 5 denote that firms of larger size are more likely to import (odds ratio of 1.447) and the estimated coefficient is positive and statistically significant ($\beta = 0.37$, $p < 0.05$), providing support for hypothesis 9.

Hypothesis 10 proposes a positive association between the networking competences of a firm and the likelihood of its internationalisation. In this case, the results of Model 5 indicate that although the odds ratio of firms with networking competences corresponds to a positive effect (odds ratio of 1.246), the positive association between networking competences and imports has no statistical significance ($\beta=0.22$, $p>0.10$). Thus hypothesis 10 was not supported.

Hypothesis 11 anticipated a positive association between the technological capabilities of a firm and the likelihood of its internationalisation. The results of Model 5 suggest that while firms with technological capabilities tended to be more likely to export (odds ratio of 1.020), the positive effect of the technological capabilities of a firm was not significant ($\beta=0.02$, $p>0.10$). Thus hypothesis 11 was not supported.

In contrast with Hypothesis 12 that relates to the positive association between the international entrepreneurial orientation of a firm and the likelihood of its internationalisation, the results of Model 5 show a negative and statistically non-significant association between the international entrepreneurial orientation of a firm and imports ($\beta=-0.22$, $p>0.10$). The odds ratio for the international entrepreneurial orientation of a firm was 0.802, indicating that firms with international entrepreneurial orientation were less likely to import compared to firms with no international entrepreneurial orientation. Hence hypothesis 12 is not supported.

In Hypothesis 13 a negative association was expected between the lack of international experiential knowledge, perceived as a limitation by a

firm, and the likelihood of its internationalisation. The results of Model 5 indicate, unexpectedly, a positive association between the lack of international experiential knowledge perceived as a limitation by a firm and imports, but statistically non-significant ($\beta=0.08$, $p>0.10$), with firms that perceived the lack of international experiential knowledge as a limitation being more likely to import than firms that did not (odds ratio of 1.083). Thus hypothesis 13 is not supported.

Hypotheses related to Entrepreneur Dimension Factors

Hypotheses 14a, 14b, 14c and 14d suggest that, respectively, the age, education, experience, and language skills of the entrepreneur of a firm are positively associated with the likelihood of its internationalisation. Contrary to expectations, the odds ratios for age (0.802), education (0.869), and experience (0.878) indicated that firms with older entrepreneurs, having higher levels of formal education, and with more years of work in the software industry tended to be less likely to import compared to firms with younger entrepreneurs, with fewer years of education, and fewer years of work in the industry. Also, the results of Model 5 indicate negative and statistically insignificant coefficients for age ($\beta=-0.22$, $p>0.10$), education ($\beta=-0.14$, $p>0.10$) and language skills ($\beta=-0.03$, $p>0.10$), and negative but statistically highly significant coefficient for experience ($\beta=-0.13$, $p<0.01$). Hence, only hypothesis 14c is supported. The negative and statistically highly significant association between experience and imports will be subject to further discussion in the final chapter.

6.2.3 Overview of the Overall Sample Results

This section provides a brief analysis of the regression results of the overall sample in Model 5, provided in Table 6.2, leading to the identification of the key determinant factors that jointly affect imports of Brazilian software firms. The model shows the best fit to the empirical data. Taken together, the empirical findings shown in Model 5 indicate that only organisational and entrepreneur-related factors can explain whether software firms import. Examining the results of the regression analyses of Model 5, four variables emerged to be the most important determinant factors of imports by Brazilian software firms.

At the organisational dimension, two explanatory variables were found to be of importance in the explanation of imports by Brazilian software firms. First, the effect of size of a firm on imports is empirically supported by statistical evidence in Model 5 as a key determinant factor. Although the other logistic models calculated did not perform well in all the tests and measures applied for their statistical assessment, the results of Models 3 and 4 also point to a positive and statistically significant association between the size of a firm and imports ($\beta=0.27$, $p<0.05$, in Model 3, and $\beta=0.41$, $p<0.05$, in Model 4). The second most important determinant of imports by Brazilian software firms at the organisational dimension is the technological capabilities of a firm, showing a positive and significant coefficient in the full model (Model 5).

With regards to entrepreneur-related factors, the experience of the entrepreneur emerged as a key determinant of imports by Brazilian software

firms, showing a negative and statistically significant association. Further, the results of odds ratio show that firms having entrepreneurs with more years of work in the software industry are less likely to import than firms having entrepreneurs with fewer years of work (odds ratio of 0.878).

Finally, the results displayed in Model 5 show that, among the control variables, the impact of age of a firm on imports by software firms is positive and statistically highly significant ($\beta=0.14$, $p<0.01$). The age of a firm increases the likelihood of imports by a software firm (odds ratio of 1.150).

6.3 Analysis of Sample Sub-Groups

In addition to the overall sample analysis provided in the previous section, the researcher performed a split-sample analysis where the differential effects of factors related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study on the propensity of software firms to import are examined on two sub-groups. The results of separate regression analyses are reported in Table 6.3.

As discussed in Chapter 5, after a series of separate logistic regression analyses were run to assess the statistical suitability of different sub-groups samples according to meaningful categories (classified by age of firm; size of firm by number of employees; market scope; business network participation; and size of firm by revenues), separate logistic regression models were estimated for two sub-groups according to the size of firm by revenues.

The sub-group “smaller firms” was classified as firms that reported in the questionnaire survey annual gross revenue in the year 2004 of less than R\$2 million, while the sub-group “larger firms” comprises firms that reported over R\$2 million of annual gross revenue in the same year. It is worth noting that the variable *Size of Firm* is related to the construction of the sub-groups’ samples and for this reason was removed in each of the sub-groups’ logistic regression analyses.

Also, given the moderately small size of the overall sample (148 firms), the control variables belonging to *Areas of Activity* were removed in each of the sub-group samples. This was done in order to meet the recommended minimum 5:1 observation-to-predictor ratio (Hair et al., 2006). As a consequence, the “smaller firms” sub-group sample’s ratio (7:1) exceeds the threshold value of 5:1 in the Full Model (Model 5) displayed in Table 6.3, with all sets of explanatory variables of the theoretical framework included. Although the “larger firms” sub-group sample’s ratio falls below the threshold ratio in the Full Model (3.6:1) of the logistic analyses, it was deemed more important to keep the explanatory variables of the theoretical framework for assessment reasons, rather than removing any further variables of the logistic models.

Following the case of the overall sample, for the same reasons explained earlier in this chapter, the constructs *External Constraints for International Operations*; *Trust*; *Commitment*; *Capabilities of Partners*; and *Interdependence between Partners* were also excluded in the logistic regression models estimated for each of the sub-groups samples. The

“smaller firms” sub-group sample consisted of 98 companies and the “larger firms” sub-group sample consisted of 50 companies. For the sake of brevity, the discussion of the sample sub-groups’ regression results is limited to the explanatory variables that show significant beta coefficient estimates in each of the two sub-groups. Also, examining the results of the five logistic models for each sample sub-group shown in Table 6.3, a comparison of the determinants of imports between smaller and larger firms is provided.

Table 6.3: Determinants of Imports: Logistic Regression Results by Sub-Groups

Dependent Variable:	Imports									
	Smaller Firms					Larger Firms				
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 1	Model 2	Model 3	Model 4	Model 5
	Contextual Factors	Network Factors	Organisational Factors	Entrepreneur Factors	Full Model	Contextual Factors	Network Factors	Organisational Factors	Entrepreneur Factors	Full Model
Intercept	0.14 (0.58)	-0.16 (0.66)	-1.10 (1.61)	0.26 (2.74)	-0.90 (2.90)	1.47 (1.27)	1.27 (1.40)	7.03** (3.28)	8.70 (7.4)	8.90 (8.35)
Explanatory Variables										
Contextual Dimension										
Institutional Connectedness	0.08 (0.13)	0.05 (0.15)	-0.01 (0.16)	-0.04 (0.17)	-0.10 (0.18)	-0.06 (0.25)	-0.12 (0.27)	-0.18 (0.31)	-0.03 (0.55)	-0.09 (0.63)
Geographical Concentration of Firms	0.21 (0.42)	0.31 (0.44)	0.33 (0.46)	0.47 (0.51)	0.15 (0.55)	0.37 (0.72)	0.40 (0.81)	0.40 (0.92)	2.17 (1.54)	0.74 (2.07)
Network Dimension										
Participation in Business Networks	-	0.27 (0.48)	0.34 (0.49)	0.03 (0.55)	0.10 (0.59)	-	-0.03 (0.89)	-0.42 (1.02)	-2.25 (2.12)	-1.24 (2.27)
Governance Mechanisms	-	0.02 (0.16)	0.03 (0.17)	0.01 (0.19)	0.05 (0.20)	-	0.11 (0.30)	0.37 (0.35)	1.39* (0.84)	1.06 (0.97)
Collaboration with Foreign Partners	-	-0.15 (0.10)	-0.18* (0.11)	-0.35*** (0.14)	-0.34** (0.14)	-	0.00 (0.00)	0.00 (0.00)	0.01 (0.01)	0.00 (0.00)
Organisational Dimension										
Networking Competences	-	-	0.18 (0.27)	0.24 (0.28)	0.42 (0.31)	-	-	-0.98 (0.76)	-1.10 (1.23)	-1.61 (1.57)
Technological Capabilities	-	-	0.02 (0.01)	0.02 (0.02)	0.04** (0.02)	-	-	0.00 (0.03)	-0.03 (0.06)	0.04 (0.13)
International Entrepreneurial Orientation	-	-	-0.17 (0.21)	-0.32 (0.23)	-0.43 (0.26)	-	-	0.69 (0.50)	0.89 (0.75)	1.20 (0.96)
International Experiential Knowledge	-	-	0.16 (0.17)	0.23 (0.18)	0.28 (0.20)	-	-	-0.88** (0.43)	-1.17 (0.73)	-1.31 (0.95)
Entrepreneur Dimension										
Age	-	-	-	-0.24 (0.35)	-0.09 (0.36)	-	-	-	-0.19 (1.40)	-0.61 (1.44)
Education	-	-	-	-0.09 (0.41)	-0.06 (0.43)	-	-	-	2.05 (1.72)	2.32 (1.89)
Experience	-	-	-	-0.05 (0.04)	-0.11** (0.06)	-	-	-	-0.34* (0.20)	-0.33 (0.21)
Language Skills	-	-	-	0.49 (0.57)	0.46 (0.61)	-	-	-	-2.57 (2.07)	-2.65 (2.46)
Control Variable										
Firm Age	-	-	-	-	0.11 (0.07)	-	-	-	-	0.18 (0.14)
Cases in analysis	98	98	98	95	93	50	50	50	49	49
Log-likelihood	131.56	128.02	125.07	115.17	104.81	45.69	44.90	38.60	22.53	21.36
Likelihood Ratio	0.57	3.10	6.92	14.19	21.07*	0.40	0.76	8.72	25.04**	27.23**
Wald Chi-Square	0.56	2.88	6.01	11.60	15.15	0.39	0.69	6.43	8.05	6.98
Hosmer & Lemeshow	7.51	4.84	8.81	21.20***	5.44	13.13	14.56*	8.94	7.20	4.67
Goodness-of-Fit										
Model R ²	0.008	0.043	0.093	0.191	0.278	0.012	0.024	0.253	0.628	0.670
Adjusted R ²	0.006	0.031	0.068	0.139	0.203	0.008	0.015	0.160	0.400	0.426

Notes: *p<0.10; **p<0.05, ***p<0.01 (standard errors in parenthesis). Figures in the table are beta (β) coefficients.

The results of the logistic regressions of the split sample analyses demonstrate that there are differences between the two samples. The findings suggest that although network, organisational and entrepreneur-related factors affect the likelihood of imports for smaller and larger firms in the Brazilian software industry, the significant factors differ as between the two groups.

The regression results in Table 6.3 show that three factors related to both the organisational and entrepreneur-related dimensions significantly impact the imports of smaller Brazilian software firms. First, the results of Model 3 show that collaboration with foreign firms has a negative and statistically significant impact on the likelihood of imports in smaller software firms ($\beta = -0.18$, $p < 0.10$). Smaller firms that collaborate with foreign partners are less likely to import than those that do not (odds ratio of 0.835).

The negative impact of collaboration with foreign partners for the explanation of imports in smaller software firms is further corroborated in Model 4, which shows a negative and highly significant coefficient for this factor ($\beta = -0.35$, $p < 0.01$). With the combined effect of all factors, as shown in Model 5, although statistically significant, the beta coefficient of collaboration with foreign partners shows a slight decrease in comparison with Model 4 ($\beta = -0.34$, $p < 0.05$), but still negatively impacts the likelihood of imports by smaller firms (odds ratio of 0.711). These results therefore suggest that collaboration with foreign partners has the strongest impact on imports by smaller Brazilian software firms.

Second, as can be observed in Model 5 of the smaller firms' sample sub-group (Table 6.3), the coefficient of the technological capabilities of a

firm, a factor related to the organisational dimension, is positive and significant ($\beta=0.04$, $p<0.05$), with smaller firms that have technological capabilities being more likely to import than firms that do not (odds ratio of 1.040).

Third, the work experience of the entrepreneur, measured by the number of years working in the software industry emerged as an entrepreneur-related factor with an unexpectedly negative impact on imports by smaller firms, as can be seen in Model 5 of Table 6.3.

Thus, combined in the full model (Model 5), collaboration with foreign partners, technological capabilities of a firm, and the experience of the entrepreneur of a firm are the three most important determinants of imports by smaller Brazilian software firms.

It is also worth mentioning that the examination of the results of the overall statistics and statistical tests of the five logistic models calculated for the smaller firms' sample sub-group demonstrates that Models 4 and 5 show a good fit to the data. A comparison between the overall fit and goodness-of-fit and other statistical measures of Models 4 and 5 suggests that the latter, including the four sets of explanatory variables as well as the control variable, is the best fitting model. The likelihood ratio of Model 5, the full model, was significant (21.07, $p<0.10$) and the value of the log-likelihood statistic of the model was 104.81 at a $p=0.001$, the most highly significant among the other logistic models of this sub-group sample, showing that the addition of the control variable, although not significant, added explanatory power to the model.

In comparison with the smaller firms' sample sub-group, the results of the larger firms' sample sub-group (Table 6.3) show that distinct factors have significant impact on the imports of larger Brazilian software firms. Looking at organisational factors, the results of Model 3 (Table 6.3) show a negative and statistically significant association between international experiential knowledge perceived as a limitation by a larger firm and the likelihood of imports ($\beta = -0.88$, $p < 0.05$), with larger firms that perceived international experiential knowledge as a limitation being less likely to import than firms that did not (odds ratio of 0.414).

Second, a network dimension variable exhibits positive and statistically significant association with imports in Model 4 ($\beta = 1.39$, $p < 0.10$), in which the four sets of explanatory variables are simultaneously tested. Larger firms with governance mechanisms in the business networks they belong to are more than four times more likely to import than firms that did not (odds ratio of 4.014), as the results in Model 4 show.

The results in Model 4 also indicate that, similarly to the results of the smaller firms' sample sub-group, a third factor related to the entrepreneur emerges as having an unexpected negative and statistically significant impact on imports: the experience of the entrepreneur ($\beta = -0.34$, $p < 0.10$), in that larger firms with entrepreneurs with more years of work in the software industry are less likely to import (odds ratio of 0.711).

The results of the overall statistics and statistical tests of the five logistic models calculated for the larger firms' sample sub-group show that Model 4, including the four sets of explanatory variables, is the best fitting

model, with the most highly significant log-likelihood value (22.53 at a $p=0.003$) among the models and a significant likelihood ratio (25.04, $p<0.05$).

6.4 Concluding Remarks

This chapter has reported the results of the main empirical data of this study, aiming at identifying the determinants of imports by Brazilian software firms. For the purpose of inferential analyses, logistic regressions were conducted to test a set of hypotheses examining the effects of factors related to the contextual, network, organisational, and entrepreneurial dimensions specified in the theoretical framework of this study as determinants of imports, an inward element of internationalisation, by Brazilian software firms.

In spite of the generally weak explanatory strength of the logistic models computed to predict imports as an inward aspect of internationalisation, three accurate models for predicting imports could be found, one using the overall sample, one using the smaller firms' sample sub-group and one using the larger firms' sample sub-group. Therefore it should be noted that the logistic regressions reported in this chapter led to the identification of relevant predictors that can explain imports by Brazilian software firms.

Based on the regression results shown in Model 5 of the overall sample, it can be noted that four determinants emerged as the most significant in the explanation of imports by Brazilian software firms. These factors are organisational and entrepreneurial-related. Ranked by order of significance, size of a firm and technological capabilities are organisational

factors that significantly impact imports by Brazilian software firms, while the experience of the entrepreneur, an entrepreneur-related factor, is also a key determinant factor. Among the control variables, the impact of age of a firm on imports by software firms has been confirmed.

Looking at the logistic regression results of smaller firms and larger firms, analysed separately, differences emerge between each of the subgroup samples. It has been demonstrated that three factors related to both the organisational and entrepreneur-related dimensions significantly affect imports by smaller Brazilian software firms: collaboration with foreign firms and technological capabilities, and the work experience of the entrepreneur, respectively. In the case of larger firms, three distinct factors emerge as significantly affecting imports: international experiential knowledge; governance mechanisms; and the work experience of the entrepreneur in the software industry - organisational, network, and entrepreneur-related factors, respectively.

The findings of this chapter and their implications, together with the empirical findings reported in Chapters 5, and in the next Chapter 7, are discussed in the final chapter of the thesis.

Chapter 7: Multidimensional Scaling

7.1 Introduction

This chapter presents the results of the application of the multidimensional scaling (MDS) method in conjunction with Facet Theory (FT), an analytical technique, during the data-analysis process. MDS is used to illustrate the relative positioning of the set of component variables of seven multi-item scale constructs of the nineteen constructs employed in the present study. It provides additional information about the structure of the survey data not readily apparent from the logistic regression analyses applied in Chapters 5 and 6.

The results shown in this chapter represent an empirical exploration of conceptually derived constructs, providing supplemental understanding to detect the implicit attributes along which respondents perceive some of the key determinants of exports and imports investigated as explanatory variables in this study. In Section 7.2, the purpose and choice of multidimensional scaling is discussed. Section 7.3 provides an overview of the interpretation of MDS configurations. Section 7.4 extends this discussion by bringing the actual application of the method into this study's context, followed by a discussion of split-sample results in Section 7.5. Section 7.6 presents some concluding remarks.

7.2 Purpose and Choice of Multidimensional Scaling

As an exploratory multivariate method, multidimensional scaling (MDS), also known as perceptual mapping, encompasses a considerable collection of data- analysis techniques and procedures (Hair et al., 2006; Jaworska and Chupetlovska-Anastasova, 2009). A common feature of all MDS applications is a geometrically portrayed visual representation of the pattern of proximities (i.e., similarities or distances) among a set of objects (firms, products, ideas, or variables) in perceptual maps. Its objective is to transform respondents' judgments of overall similarity into distances represented in a multidimensional space, revealing unrecognised attributes or combinations of attributes of variables present in the data (Mingoti, 2005; Hair et al., 2006; Ivens, 2006; Groenen and Van der Lans, 2006; Wen and Yeh, 2010).

In contrast with other multivariate interdependence techniques²⁵ such as factor and cluster analysis, the analysis provided by MDS focuses not on the variables themselves, but on respondents' perceptions. Moreover, the perceptions of both the respondents and the researcher - with his or her conceptually-derived frameworks for the design of the research and the testing of a theory - can be compared and contrasted.

As Hair et al. (2006) observe, a distinct feature of MDS is that it does not require a list of defined attributes to be shown to the respondents. Furthermore, a solution can be obtained for each individual. Ivens (2006)

²⁵ Multivariate interdependence techniques involve the simultaneous analysis of all variables in which no single variable or group of variables is classified as being independent or dependent. The effort is to find an underlying structure of the entire set of variables (Hair et al., 2006, p. 17).

asserts that MDS is an adequate multivariate method which is not primarily based upon an *ex ante* formulation of statements. The author states:

"Identifying the criteria along which an object is being classified in an observer's mind implies discovering the dimensionality of the judging individual's perceptual space." (p.248)

By finding overall perceptions of respondents, the application of MDS, as a complementary and flexible statistical tool provides an intuitive and more comprehensive perspective of the hidden structure of this study's survey data aided by graphics (Corrar et al., 2007). MDS makes it possible, therefore, to examine the associations between variables of conceptually derived constructs in this thesis, and to observe how variables relate to each other, linking back to theory development.

Having a graphical display of the structure of the data, one that is much easier to understand than an array of numbers, the application of MDS allows the researcher to analyse the essential information in the data, smoothing out noise, as Borg and Groenen (2005) argue. However, although widely used in studies dealing with perception (Jaworska and Chupetlovska-Anastasova, 2009) and for subjects such as hospitality/tourism and marketing, as a popular method for brand or product positioning (Wen and Yeh, 2010), the application of multivariate statistical approaches such as MDS, despite its potential, has been less usual in international business research.

The MDS method was chosen in this survey questionnaire study because other multivariate techniques, such as factor analysis, require the underlying data to be continuous and/or normally distributed, which is not the case in this study. MDS allows the researcher scope for the diagnosis and

discrimination of distinct patterns of perceptions by respondents in regard to possible determinant factors affecting the internationalisation of Brazilian software firms, measured by exports and imports, providing structural insights into the research questions. Also, the use of MDS in this study may reveal findings not considered during the formulation of the original hypotheses. In this sense, an exploratory approach is taken, since the purpose is to uncover qualitative aspects of the constructs under investigation, not to confirm or refute them.

Moreover, given the predominance of entrepreneurs, as decision-makers playing a crucial role in relation to the strategic direction and decisions of firms, among the respondents of this study's survey questionnaire (see Section 4.8 in Chapter 4), it is considered that they add sufficient depth of knowledge to address the issues investigated in this MDS analysis.

The MDS analyses discussed in this chapter were performed with the aid of the Statistica software which has sufficient capabilities and includes support for a number of different MDS procedures. Also, because of the nature of the data in this study, a non-metric MDS approach was chosen.

Facet Theory

Developed from the original work of Louis Guttman, in 1954, the Facet Theory (FT) approach has allowed behavioural and social scientists to integrate theory construction, research design, and choice of observations, data analysis, and interpretation of the empirical structures of observations (Guttman and Greenbaum, 1998). Following Guttman's concept, a facet can

be defined as “a set of attributes (variables) that together represent underlying conceptual and semantic components within a content universe” (Guttman and Greenbaum, 1998, p. 17).

As a relatively new approach to social research, FT helps researchers to decide on the partitioning of the empirical space obtained through MDS and to analyse if there are elements in a particular facet that correspond to regional partitions of that space. As Groenen and Van der Lans (2006) emphasise, each facet, whose lines are usually drawn by hand, is assumed to partition the MDS space in one of three ways: a) by an axial partitioning (division into slices along a line; b) by a modular partitioning (division into concentric bands); or c) by a polar partitioning (division into pie pieces).

Facet theory postulates that the facets entail particular structures of empirical associations between variables, facilitating the interpretation of the MDS space in terms of regions rather than dimensions. Finally, facet design has allowed the development of different methods for nonmetric multidimensional scaling such as Guttman’s Smallest Space Analysis (SSA) where the notion of “smallest space” denotes the minimal number of dimensions needed to obtain a geometric representation of a body of data with a good fit (Guttman and Greenbaum, 1998).

Thus, the results of the MDS analyses carried out in this study were interpreted by means of Facet Theory, i.e., through visual inspection of the proximity of the questionnaire variables to each other on the map *vis-à-vis* the theoretical perspectives originally used for the design of the study questionnaire, with labelling of each of the spatially identified facets.

7.3 Interpretation of MDS Configurations

As a highly inferential technique in nature, MDS solutions are used in this study as a complementary analytical tool for enhancing the ability of the researcher to interpret, via Facet Theory (FT), the associations between variables considered as explanatory factors for the internationalisation of software firms, providing structural insights into the research questions.

There are two aspects to be assessed when examining MDS perceptual maps: a) dimensions, axes item attributes, that seem to order the items in the map along a continuum; and b) the existence of clusters, represented in the map as groups of items that are closer to one another than to other items (Jaworska and Chupetlovska-Anastasova, 2009). The analysis provided in this chapter will be limited to the latter.

In Facet Theory, these clusters are located in spaces in the perceptual map called “regions”. The MDS map is partitioned into “regions” where the clusters of variables are located. The regions in the MDS map are the components of each construct, and they are represented by the variables. The use of Facet Theory also influences the emphasis of the analysis on regions rather than dimensions, because the main attention of the researcher is focused on the relationships between the variables.

Once a perceptual map is obtained, the interpretation of the MDS solution is based on an intuitive and inferential process where the researcher makes subjective evaluations of the perceptual maps and decides whether a reasonable configuration was achieved. Hair et al. (2006) emphasise that multidimensional scaling techniques have no built-in procedure for labelling. Thus, following previous research using multidimensional data analysis

(Guttman and Greenbaum, 1998), the researcher developed three steps for the interpretation of the MDS configurations.

First, the researcher carried out, in an iterative manner, the subjective procedure of classifying the interrelations among the variables that emerged from the statistical MDS analysis for each construct under assessment in this study into meaningful clusters, which will be interpreted as regions. Second, the MDS map was partitioned into as many regions as the resulting interrelation patterns that emerged among all variables. Each region was only separated from others by a boundary with variables at the edge of a region being carefully examined against other variables in the neighbouring region. Differently from clusters, however, there are no empty spaces around a subset of variables in regions, only boundaries. Third, for interpreting and labelling these regions within each MDS perceptual map generated for the constructs under analysis, the theoretical framework of the study was reviewed for accordingly. In the process of interpreting the results, the researcher undertook several assessments of the MDS spatial maps generated until a final judgment could be reached.

The Dimensionality of MDS Configurations

The application of multidimensional scaling requires that a square matrix of dissimilarities is used to calculate the dimensions of interest in a p -dimensional space, which usually takes the value $p \geq 2$ (two-dimensional graph). MDS representations for each set of objects are shown graphically and can be displayed in n -dimensional solutions.

A MDS solution consists of a configuration which represents a pattern of points located in a space of a small number of dimensions where the distances between the points correspond to the similarities or dissimilarities between them. Following iterative procedures, aided by computational resources, the researcher is able to assess how well the dimensional configuration represents the data. Also, the researcher must evaluate whether a given solution adds explanatory power to the analysis.

There is no minimal dimensionality for a perfect MDS configuration, although the goal of the researcher should be to reduce the observed complexity, that is, to explain the distance matrix in terms of fewer underlying dimensions (Borg and Groenen, 2005). A common way to evaluate the number of dimensionalities necessary for a good MDS solution, capable of interpretation by the researcher, is to plot the Stress, measured by goodness-of-fit or badness-of-fit values, against different numbers of dimensions (Kruskal and Wish, 1978). Along with subjective evaluation of the interpretability of perceptual maps by the researcher, or an overall index of fit, the use of Stress measures is one of the three suggested approaches in the literature for the determination of how many dimensions are actually represented in the data (Hair et al., 2006).

From a mathematical standpoint, the Kruskal's Stress statistic is the most commonly used measure to evaluate how well (or poorly) a particular MDS configuration reproduces the input data (Hair et al., 2006; Jaworska and Chupetlovska-Anastasova, 2009). It amounts to the computation of the sum of squared deviations of observed distances (or some monotone transformation of those distances) from the reproduced distances. Thus, the

smaller the Stress value, as an accuracy measure to assess the quality of the point configuration in a MDS solution, the better is the model, showing the fit of the reproduced distance matrix to the observed distance matrix. High Stress values are indicative of errors associated with the fit of the configuration space to the original data. As a result, visualisation of the MDS configuration could be misleading. As the number of dimensions used goes up for any given dataset, the Stress must either come down or stay the same. It can never go up.

Although no strict rule exists for defining the tolerance level of Stress, the general guidelines recommended by Kruskal for evaluating a MDS solution for the non-metric Stress criterion is: 0.20, poor; 0.15, tolerable; 0.10, fair; 0.05, good; 0.025, excellent; and 0, exact (Corrar et al., 2007; Jaworska and Chupetlovska-Anastasova, 2009).

According to Hair et al. (2006), while MDS is a flexible and highly intuitive method, the researcher must be aware of two issues when dealing with the objects being evaluated. First, the researcher must ensure that the objects being compared have some set of underlying attributes that form the basis for comparisons by respondents. A second issue that must be taken into account is the number of objects to be evaluated. The researcher must follow general guidelines of at least four objects for a stable multidimensional solution.

Using the above criteria, it is possible to observe that all multi-item constructs employed in this study, as stated in previous chapters, are elaborated and conceptualised in a theoretical framework in which the relevance of variables was assessed against established theory. Thus the

first criterion is accomplished in this analysis. However, some of the multi-item constructs of this study did not meet the second criterion as they fall below the minimum required number of items for a stable MDS solution and were consequently discarded. For this reason, only seven constructs were included in the MDS analysis: *Institutional Connectedness*; *External Constraints for International Operations*; *Trust*; *Governance Mechanisms*; *Networking Competences*; *International Entrepreneurial Orientation*; and *International Experiential Knowledge*.

Some of the Stress values of the constructs selected for the MDS analysis exceeded the 10 percent level for a two-dimensional solution, leading the researcher to further test MDS solutions of the constructs in 3 or 4-dimensional solutions. The assessment of Stress values for the definition of the adequate number of dimensions for each multi-item construct under examination is presented in Table 7.1.

Table 7.1: Assessment of Stress Values for MDS Solutions of Constructs

Construct	Number of items	Stress 2-D	Stress 3-D	Stress 4-D
Institutional Connectedness	06	0.00	-	-
External Constraints for International Operations	16	0.21	0.14	0.09
Trust	07	0.04	-	-
Governance Mechanisms	06	0.00	-	-
Networking Competences	20	0.12	0.06	0.05
International Entrepreneurial Orientation	23	0.15	0.11	0.07
International Experiential Knowledge	06	0.01	-	-

A 3 or 4-D solution would make very difficult the visualisation of the MDS space using standard graphing methods, and also the interpretation process. Thus, when dimensionality of the MDS solutions was higher than 2, it was decided to present a two-dimensional projection (Dimension 1 X

Dimension 2) with the aid of the Statistica software program used for the analysis. This was the case for the constructs *External Constraints for International Operations*; *Networking Competences*; and *International Entrepreneurial Orientation*.

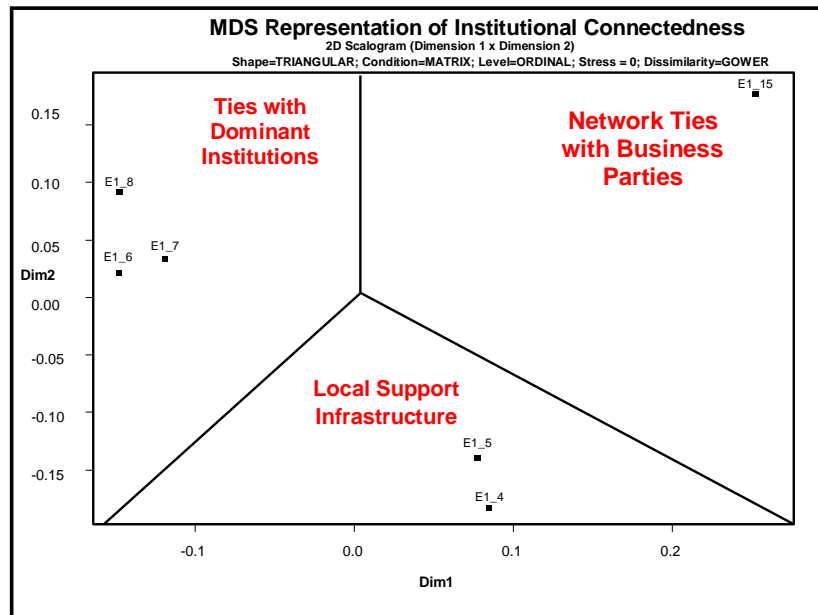
7.4 The Application of MDS in this Study

This section presents the results of the application of MDS statistical analyses performed on the responses from a sample of 148 software firms which took part in this study. The data plotted in the MDS representations is discussed next. The labels defined for each construct's grouping of variables are brief summaries of content analysis categories. For detailed information about the questionnaire's variables under scrutiny, shown as numbered points in the MDS Scalograms presented in Figures 7.1 to 7.34, see Appendix F.

Institutional Connectedness

A 2-D MDS Scalogram with a polar pattern is shown in Figure 7.1, displaying the two-dimensional representation for the six variables of the *Institutional Connectedness* construct.

Figure 7.1: MDS Representation of Institutional Connectedness



The results of the MDS analysis report a Stress value of 0 which represents an excellent fit. As can be seen in Figure 7.1, three groupings of variables allowed the researcher to identify the “Local Support Infrastructure”; “Ties with Dominant Institutions”; and “Network Ties with Business Partners” facets as meaningful regions of the institutional connectedness construct.

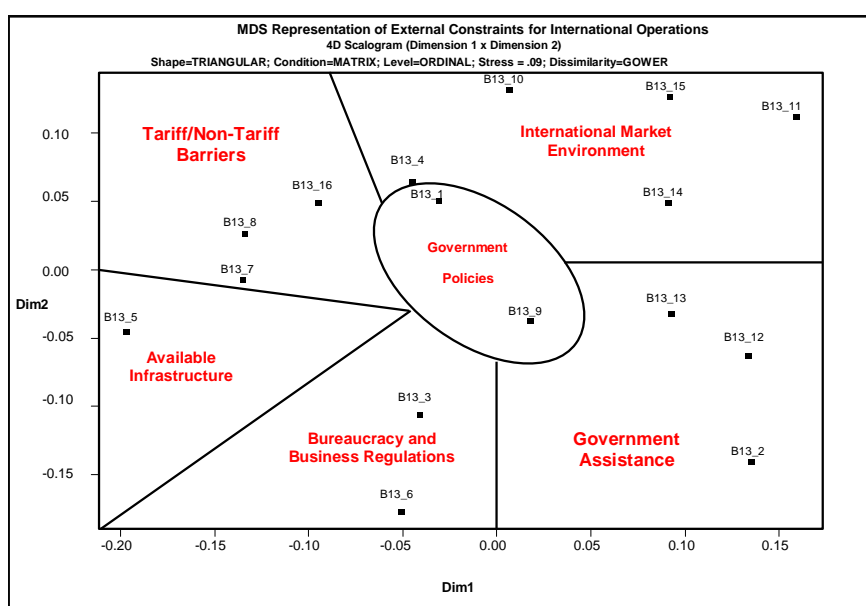
It could be argued that the breadth of the distribution of variables along the two axes shows that entrepreneurs perceive a wide array of distinct elements in their set of potential institutional network resources. Such large distances between managerial perceptions of network resources may indicate that policy makers should take this factor into account when implementing institutional networks. The perceptual proximity of variables related to availability of and access to support structure, on the one hand, and the perceptual distance of location of network partners and dominant

institutions on the other, might indicate that respondents perceive the importance of the latter on a national-level basis.

External Constraints for International Operations

Figure 7.2 portrays the six facets of *External Constraints for International Operations* which emerged from the process of partitioning the MDS space for the analysis of the construct. The results of the analysis report a Stress value of .09 which represents a fair fit of the MDS configuration. The 4-D MDS Scalogram depicted in Figure 7.2 shows a combination of modular and polar patterns, allowing the establishment of six facets labelled as follows: "Government Policies", near the centre, surrounded by "International Market Environment"; "Tariff/Non-Tariff Barriers"; "Available Infrastructure"; "Bureaucracy and Business Regulations"; and "Government Assistance".

Figure 7.2: MDS Representation of External Constraints for International Operations



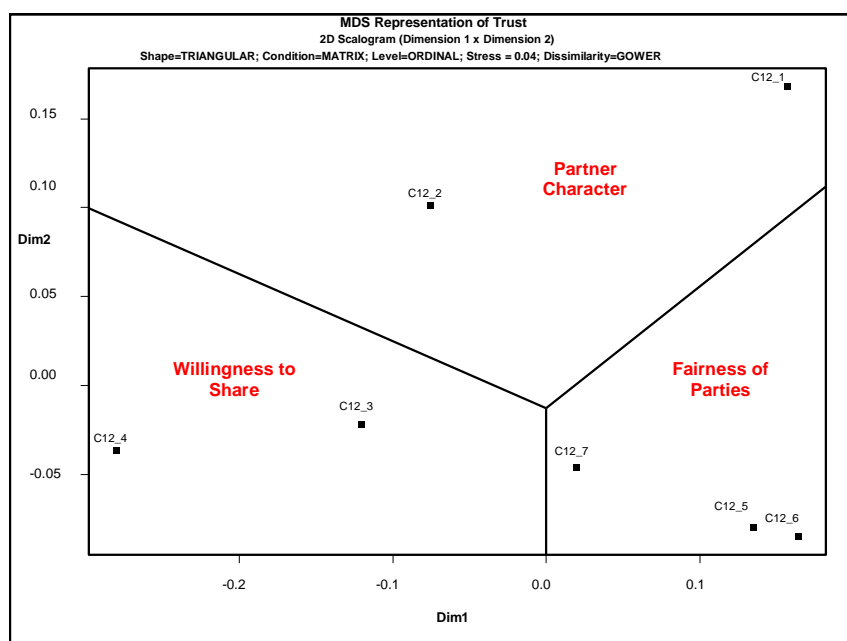
The centroid region of “Government Policies” indicates management’s perception of the critical importance of constraints perceived in the domestic market, likely to represent a threat to the development of a firm’s international operations among other environmental conditions, as compared to foreign-market characteristics perceived as barriers. Moreover, the MDS representation also shows the surrounding, near the “Government Policies” region, of the variables located in the other five regions identified in the map. This result leads to the speculation that entrepreneurs in this study may attribute a focal role to Governmental actions in the presence or reduction of many structural impediments for the development of their firm’s international operations.

Although the overall result of the MDS configuration for the *External Constraints for International Operations* construct is consistent with previous research (Da Silva and Da Rocha, 2001), this analysis also sheds light on some overlooked aspects of previous research such as the importance placed on governmental institutions in creating sustaining conditions to meet the needs of firms aiming to develop international operations on either the importing or exporting side, or both (Zahra, 2005).

Trust

The 2-D MDS Scalogram of the *Trust* construct shown in Figure 7.3 displays a polar pattern with three facets which emerged from the MDS analysis.

Figure 7.3: MDS Representation of Trust



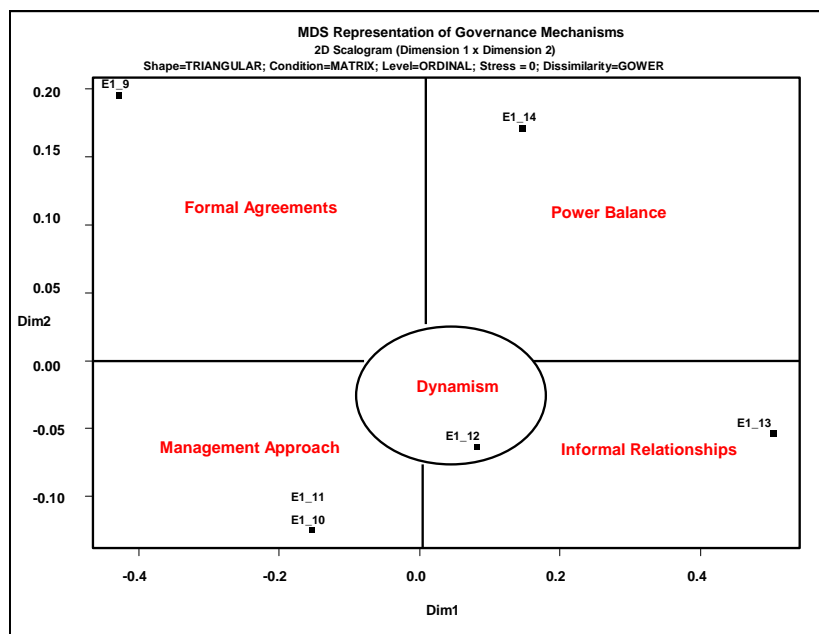
The results of the MDS analysis report a Stress value of .04 which represents a good fit of the solution. The three facets of the construct *Trust*, representing factors for the success of business networks, were labelled: “Partner Character”; “Willingness to Share”; and “Fairness of Parties”. The closest variables plotted in the MDS map appear within the “Fairness of Parties” region, with fairness in joint negotiations (C12_7) occupying nearly the centroid location of the *Trust* construct in the perception of respondents.

The interrelatedness of more rational domains of trust, determined by established practices such as joint negotiations, strongly suggests that they are critical in shaping the rules for engagement in collaborative relationships through business networks. On the other hand, the farther location of characteristic-based elements of trust (C12_1 and C12_2) in the MDS map may indicate they are perceived as less significant factors influencing the ability of entrepreneurs to build trusting relationships.

Governance Mechanisms

In Figure 7.4, a 2-D MDS Scalogram with a combination of modular and polar patterns provides a representation of five facets for the *Governance Mechanisms* construct. The results of the MDS analysis report a Stress value of 0 which represents an excellent fit. In the map shown in Figure 7.4 five distinct groupings of variables can be identified, defining the following regions of the *Governance Mechanisms* construct: “Dynamism”, near the centre, surrounded by “Formal Agreements”; “Power Balance”; “Management Approach”; and “Informal Relationships”.

Figure 7.4: MDS Representation of Governance Mechanisms



The plot in Figure 7.4 can provide some insight into the relationships between the variables within the five regions depicted. One such insight is that, according to the respondents, established mechanisms for planning, budgeting, and other operational links are closely associated with the

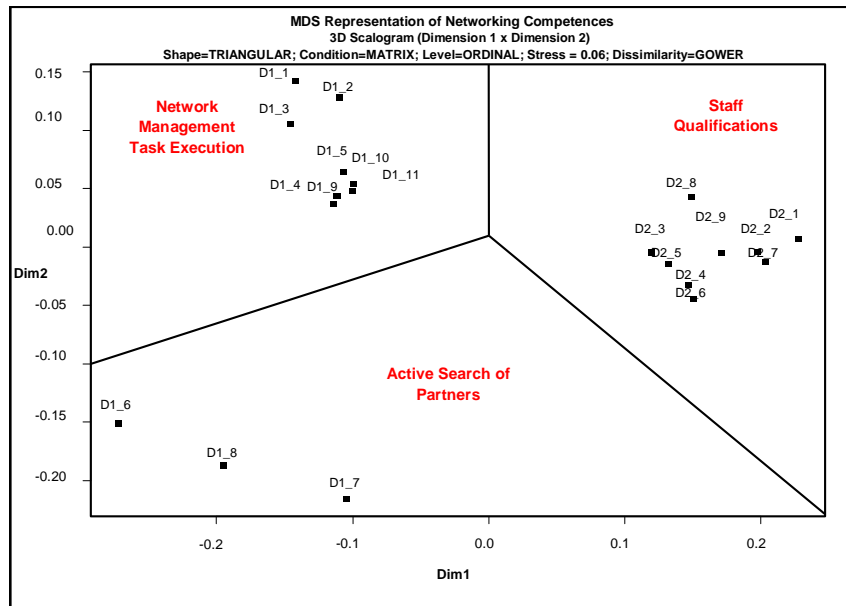
dynamism needed for the effective functioning of business networks' governance mechanisms.

On the other hand, the MDS representation also shows the establishment of formal terms of collaboration (E1_9) on the periphery of the map. In the perception of respondents, this aspect is seen as a separate and less critical element for the functioning of governance mechanisms in business networks. This result may also suggest that, given its complex nature, the construct deserves further empirical investigations to review whether its scale items capture the dimensions that are relevant to *Governance Mechanisms*.

Networking Competences

On the 3-D MDS Scalogram shown in Figure 7.5 a polar pattern of the *Networking Competences* construct emerges. The representation resulting from the MDS analysis applied, with a Stress value of .06, which represents a good fit, shows three groupings of variables which were interpreted and named as the following facets: "Network Management Task Execution"; "Staff Qualifications"; and "Active Search of Partners". Consisting of eight and nine variables, the "Network Management Task Execution" and the "Staff Qualifications" regions, respectively, concur with Ritter et al.'s (2002) scale to measure a firm's network competence.

Figure 7.5: MDS Representation of Networking Competences



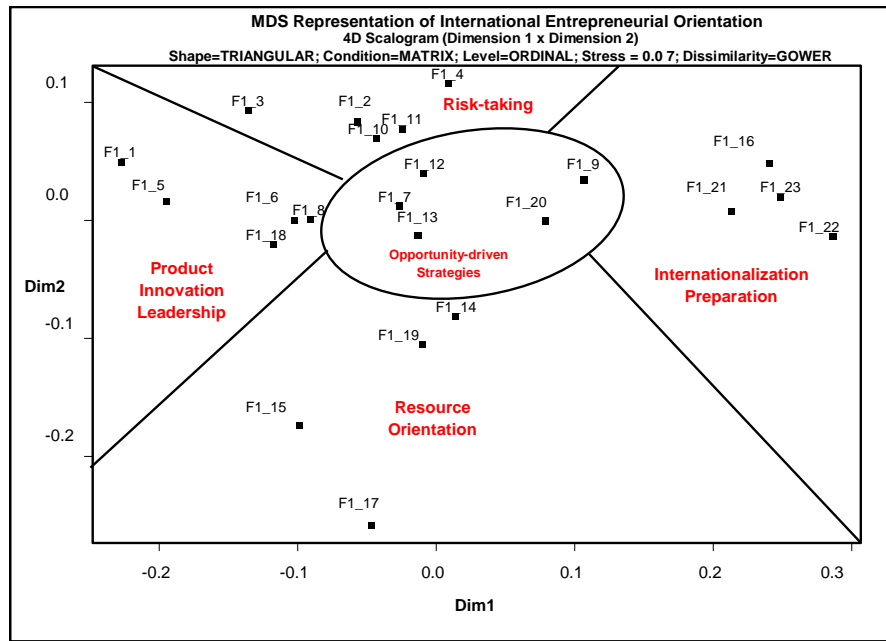
Although two of the three defined facets correspond to the theoretically derived construct of *Networking Competences*, "Active Search of Partners" emerged as a distinct, novel and potentially useful dimension for the understanding of specific tasks that need to be performed to build the basis of a firm's network competence. Being the first attempt to replicate the empirical investigation of the network competence concept in non-European settings and in a specific industry context, this MDS result, together with the logistic regression analyses of Chapters 5 and 6, provides the basis for further refinements of the current set of variables in the scale.

International Entrepreneurial Orientation

In Figure 7.6, a 4-D MDS Scalogram with a combination of modular and polar patterns provides a representation of the *International Entrepreneurial Orientation* construct which emerged from the process of

partitioning the MDS space. The Stress value of the MDS solution is .07 which represents a good fit of the data.

Figure 7.6: MDS Representation of International Entrepreneurial Orientation



After several attempts, the researcher was able to identify and interpret five meaningful facets for the understanding of the *International Entrepreneurial Orientation* construct which are depicted in the MDS Scalogram shown in Figure 7.6. We have tentatively labelled them: “Opportunity-driven Strategies”; “Risk Taking”; “Product Innovation Leadership”; “Internationalisation Preparation”; and “Resource Orientation”.

As indicated in Figure 7.6, five variables form the central region of the *International Entrepreneurial Orientation* construct’s MDS map, being labelled “Opportunity-driven Strategies”. The variables appearing in this region were adapted from three distinct scales developed by Knight (2001), categorised as “strategic competence” (F1_7 and F1_9); and Brown et al.

(2001), categorised as “strategic orientation” (F1_12 and F1_13) and “growth orientation” (F1_20). For more detail on the operationalisation of this multi-item construct, see Section 4.6.1.

This result indicates that the ability of entrepreneurs to define business strategies based on the recognition and exploration of the opportunities in international markets is perceived by respondents as the core of the *International Entrepreneurial Orientation* concept. Moreover, this result suggests that such attitudes may be affecting the degree to which firms pursue opportunities in the international marketplace.

Another aspect worth mentioning is the emergence of a clear “Internationalisation Preparation” region in the map which confirms the interrelatedness, among this grouping of variables, of three items of a multi-item scale developed and tested by Knight (2001) and their importance as factors likely to influence the international performance of firms.

The graphical representation of the MDS Scalogram in Figure 7.6 also shows the closeness between variables in the regions “Opportunity-driven Strategies”; “Product Innovation Leadership”; and “Risk Taking”, as well as the location of many variables belonging to these regions on the boundaries of their corresponding slices. This may indicate that although they are distinct conceptually, the relative overlapping nature of such variables would suggest the need for a review of variables pertaining to this multi-item scale construct, in particular those in the three regions cited above, by further empirical validation. Also, the location of four variables in the “Resource Orientation” region, farther from the centroid of the map, indicates the

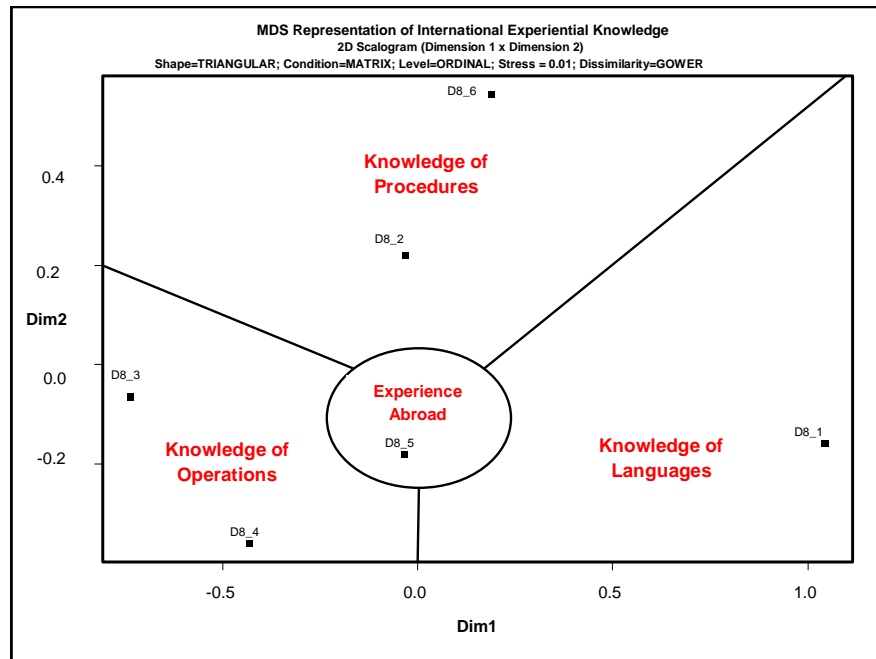
perceived lower criticality of resources ownership and control in the entrepreneurial view of respondents.

This MDS result also validates three measurement variables previously tested in a multi-item scale developed by Brown et al. (2001) to assess entrepreneurial management, as discussed in detail in Section 4.6.1 of Chapter 4. The application of the MDS method for the *International Entrepreneurial Orientation* construct provides a combined examination of two conceptual frameworks - “international entrepreneurial orientation” and “entrepreneurial management” - proposed and tested in specific measurement instruments by Knight (2001) and Brown et al. (2001), respectively. The need for using both instruments in an integrated manner has been suggested by Brown et al. (2001). Thus this analysis represents an opportunity for a more complete view of several aspects for the examination of international entrepreneurial phenomena as a strategic dimension of the firm, an argument advanced by some authors (Brown et al., 2001; Knight, 2001; Messeghem, 2003).

International Experiential Knowledge

On the 2-D MDS Scalogram, shown in Figure 7.7, a combination of modular and polar patterns of the *International Experiential Knowledge* construct emerges.

Figure 7.7: MDS Representation of International Experiential Knowledge



The representation resulting from the MDS analysis applied, with a Stress value of .01, corresponds to an excellent fit of the configuration to the original data. Looking at the MDS Scalogram shown in Figure 7.7, it is possible to observe that four separate groupings of variables emerged from the MDS analysis, constituting the interpretable facets of “Experience Abroad”; “Knowledge of Procedures”; “Knowledge of Operations”; and “Knowledge of Languages”. The facet “Experience Abroad” displays one variable (D8_5) located near the centre of the Scalogram, suggesting that a firm’s experiential knowledge of foreign markets derived from an exposure to a situation abroad is perceived of great value by respondents in this study. Its lack is problematic and may constitute a perceived barrier for the subsequent engagement of a firm in international operations.

The analysis also reveals that variables located in the three other regions of “Knowledge of Procedures”; “Knowledge of Operations”; and “Knowledge of Languages” are situated far outside the centroid of the MDS map, and that significant distances in the graphic representation exist between each of them. This result strongly suggests the need for further theoretical elaboration that can lead to validation of measures for the different variables that have been categorised as related to the international experiential knowledge concept in previous studies (Johanson and Vahlne, 1997; Eriksson et al., 1997).

7.5 Split-Sample Results

This section presents the MDS results for the two distinct sub-samples of respondent firms. Among several approaches to validate MDS results, Hair et al. (2006) and Jaworska and Chupetlovska-Anastasova (2009) suggest split-sample or multisampling comparison as the most time- and cost-effective method, in which either the original sample is divided or a new sample is collected. Thus, after the aggregate analyses of the single MDS solutions obtained from the examination of all respondents in this study’s sample, a second step was taken for the generation of perceptual maps on the basis of two sub-groups of firms: exporters and non-exporters; and importers and non-importers. Based on the study’s objectives, the purpose of this additional aggregate approach is to understand variation among these distinct sub-groups, an effort towards ensuring the generalizability of the MDS solutions obtained in this analysis.

There is reason to expect that the perceptions of factors influencing the internationalisation of a firm, measured by exports and imports, may vary depending upon the type of international engagement in which a firm is already involved. Further, the importance of managerial perceptions of entrepreneurs as key explanatory factors of internationalisation has been reported in other studies (Zahra, 2005).

Therefore, the split-sample approach enables the researcher to identify the shared managerial perceptions and evaluative dimensions within specific sub-groups relevant to this study, addressing a gap in the area of international business research in relation to potential differences between perceptions of different types of non-exporters (Crick, 2004). Tables 7.2 and 7.3 display the results of the assessment of Stress values for defining the number of dimensions for the MDS solutions of each of the four groupings of respondent firms.

Table 7.2: Stress Values for MDS Solutions (Exporters and Non-Exporters)

Construct	<i>Exporters</i>		<i>Non-Exporters</i>	
	Number of Dimensions	Stress Value	Number of Dimensions	Stress Value
Institutional Connectedness	2	0	2	0
External Constraints for International Operations	4	.09	4	.08
Trust	2	.03	2	.04
Governance Mechanisms	2	0	2	0
Networking Competences	3	.12	3	.06
International Entrepreneurial Orientation	4	.10	4	.08
International Experiential Knowledge	2	.08	2	.01

The assessment of the Stress values for MDS Solutions, shown in Tables 7.2 and 7.3, indicates that they fall below the tolerable levels of Stress in both sub-groups of firms participating in this study.

Table 7.3: Stress Values for MDS Solutions (Importers and Non-Importers)

Construct	Importers		Non-Importers	
	Number of Dimensions	Stress Value	Number of Dimensions	Stress Value
Institutional Connectedness	2	.01	2	0
External Constraints for International Operations	4	.09	4	.07
Trust	2	.11	2	.04
Governance Mechanisms	2	0	2	.02
Networking Competences	3	.08	3	.09
International Entrepreneurial Orientation	4	.08	4	.09
International Experiential Knowledge	2	0	2	.09

The researcher followed the steps outlined in Section 7.3 for the interpretation of the MDS configuration generated for the two sub-groups of firms. However, due to space limitations, we are going to focus the discussion of the MDS results in this section only on major differentiations or commonalities observed between the four groupings of the two sub-groups, and between these and the full sample.

Institutional Connectedness

In respect of factors related to the *Institutional Connectedness* construct, the data plotted in the MDS Scalograms shown in Figures 7.8 and 7.9, for exporters and non-exporters, and in Figures 7.10 and 7.11, for importers and non-importers, respectively, reveal the same polar pattern as for the MDS full sample results.

Major distinctions of general perceptions among the two sub-groups of respondents could not be observed. However, two aspects that emerged as differences of perceptions among the two sub-groups are worth mentioning. First, the centroid location of variables related to the “Local Support Infrastructure” region observed in the non-importers group’s MDS map. Second, the closest associations between two variables (E1_6 and E1_7) belonging to the “Ties with Dominant Institutions” region in both the non-exporters and importers perceptual maps.

Figure 7.8: MDS Representation of Institutional Connectedness (Exporters)

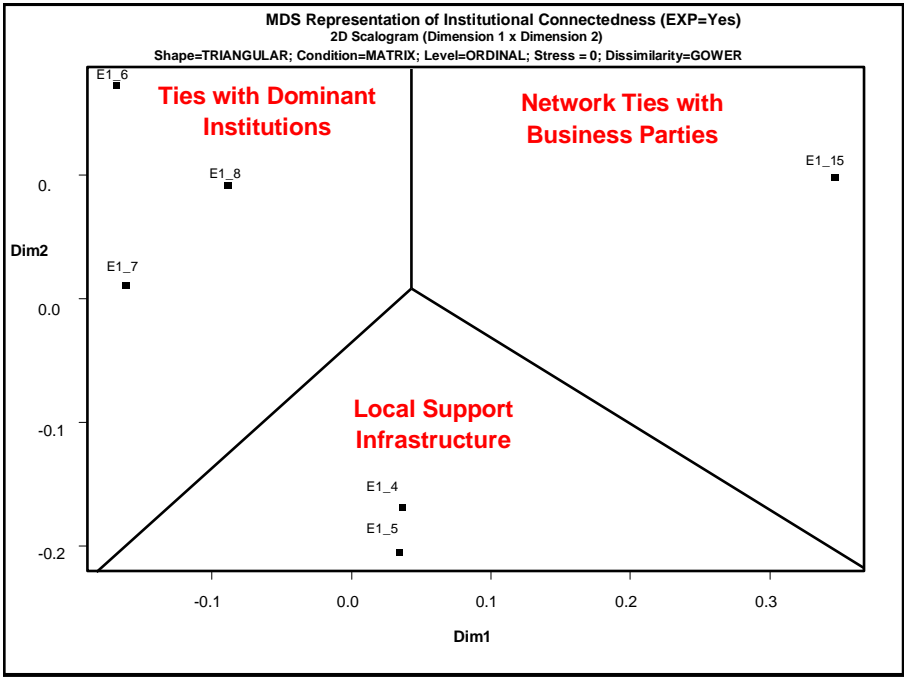


Figure 7.9: MDS Representation of Institutional Connectedness (Non-Exporters)

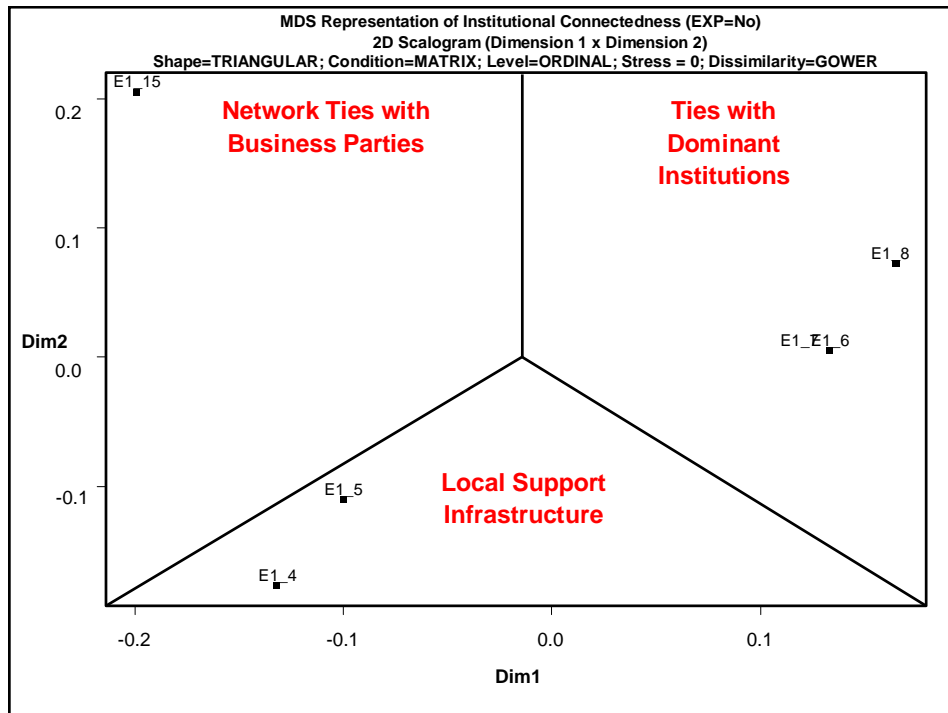


Figure 7.10: MDS Representation of Institutional Connectedness (Importers)

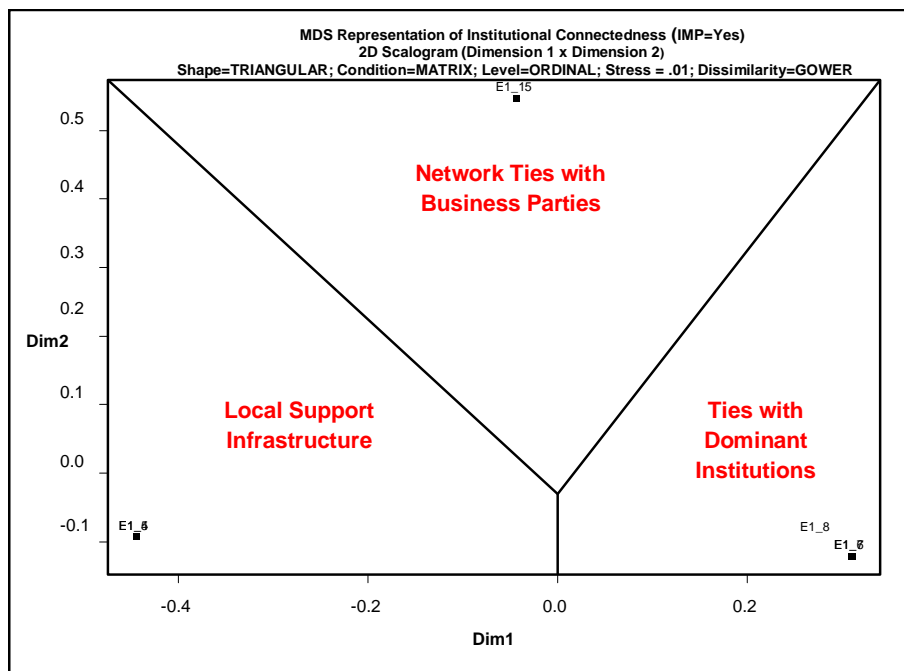
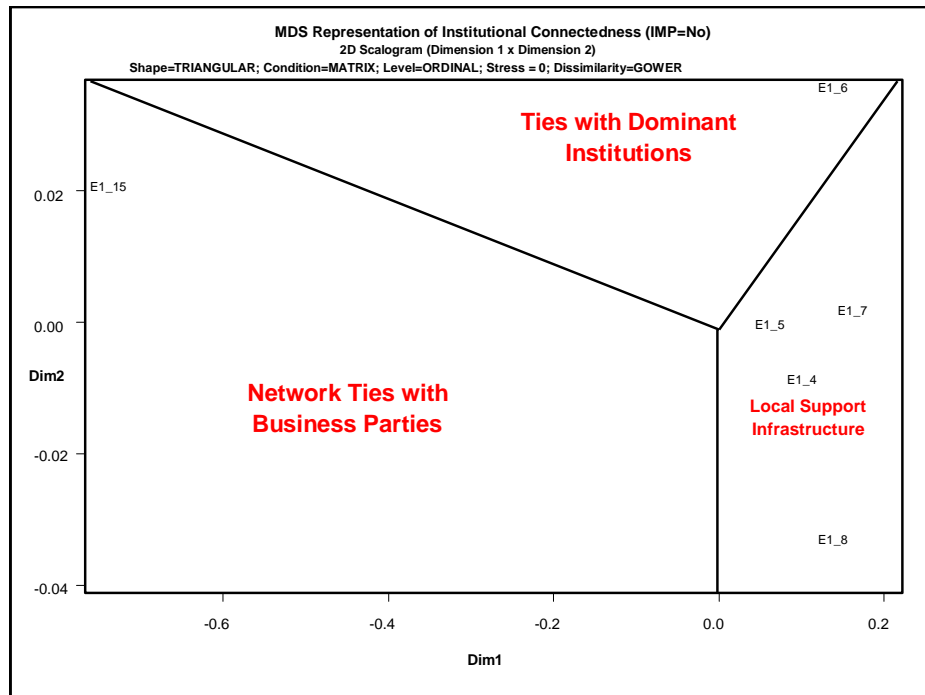


Figure 7.11: MDS Representation of Institutional Connectedness (Non-Importers)



External Constraints for International Operations

The MDS solutions of the *External Constraints for International Operations* construct for exporters and non-exporters are given in Figures 7.12 and 7.13, and for importers and non-importers in Figures 7.14 and 7.15, respectively. Analysing the data plotted in the MDS Scalograms of these sub-groups it can be observed that the same combination of modular and polar patterns emerges as in the full sample.

Also, there is a clear parallel between the perceptual maps of the two groups, exporters and importers, and the full sample, whereas a few differences can be observed in the perceptual maps of non-exporters and non-importers. For example, a distinct association of variables appears in the regions shown in the perceptual maps of non-exporters and non-

importers. This led the researcher to review the labelling of the regions in the corresponding MDS Scalograms.

Thus, in the MDS Scalogram of non-exporters (Figure 7.13) the region “Cultural Distance”, occupying the centroid location of the map, was labelled with two variables (B13_8 and B13_10) originally pertaining to two distinct regions (International Market Environment and Tariff/Non-Tariff Barriers) of the MDS solution in the full sample (Figure 7.2).

Figure 7.12: MDS Representation of External Constraints for International Operations (Exporters)

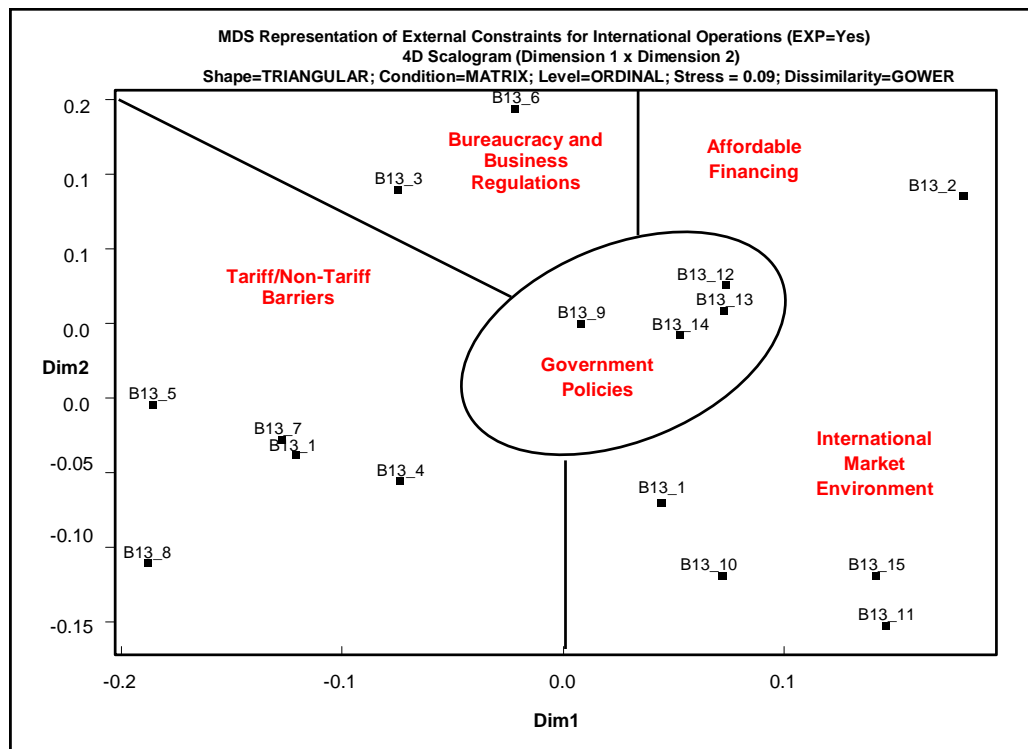


Figure 7.13: MDS Representation of External Constraints for International Operations (Non-Exporters)

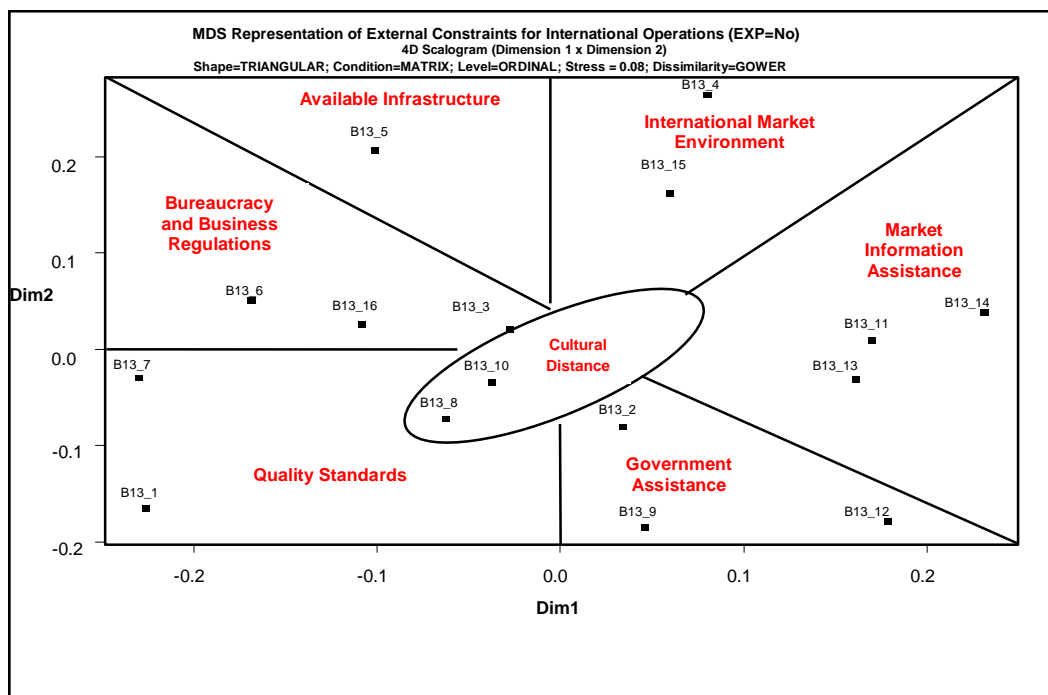
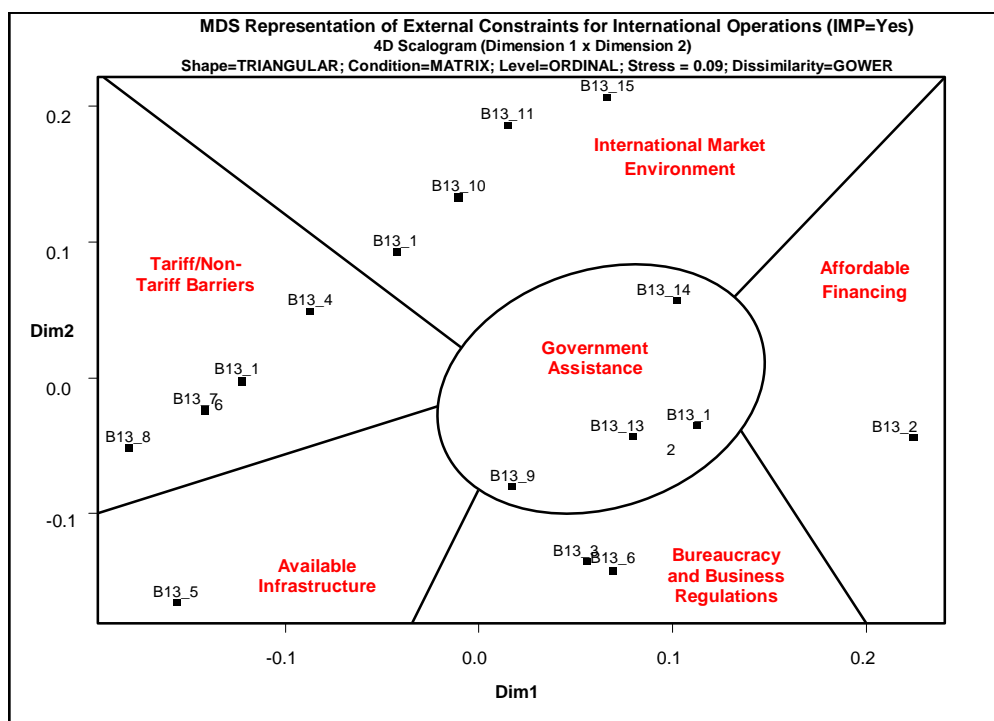
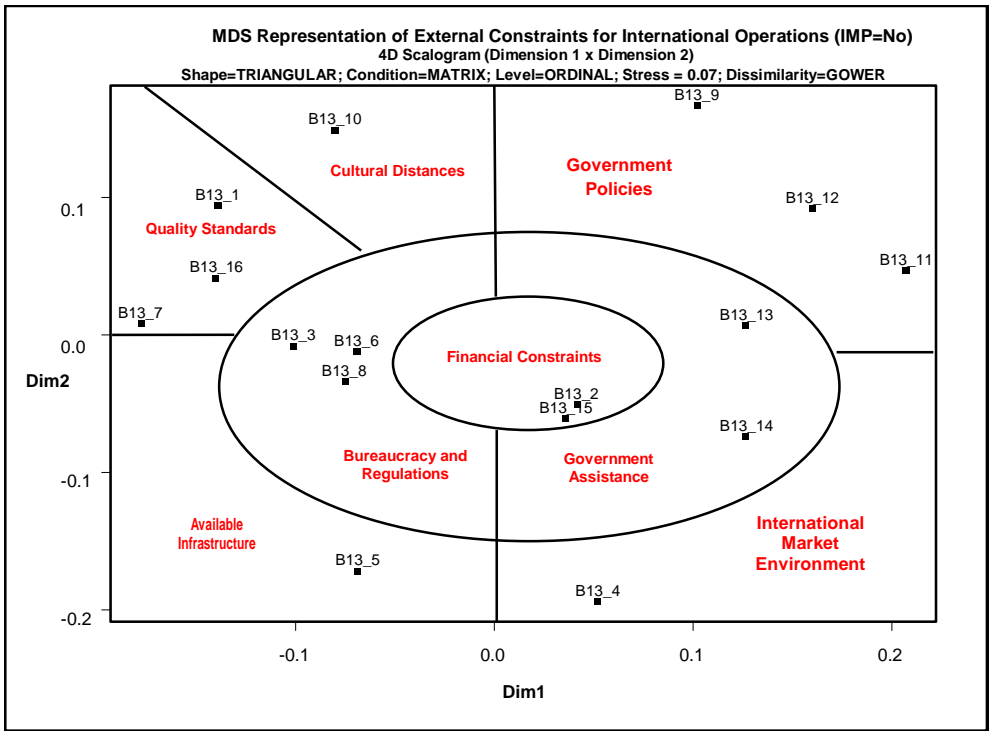


Figure 7.14: MDS Representation of External Constraints for International Operations (Importers)



In the MDS Scalogram of non-importers, the centroid region, with two variables, one related to availability of financing (B13_2) and the other to competition in international markets (B13_15) was labelled “Financial Constraints”, showing an unexpected association between these two variables. The combination of these two variables, seen as impediments, may indicate that the lack of financing at affordable rates was perceived as a factor bringing operational problems and cost disadvantages for the non-importing firm forced to compete, even in the domestic market, with international players, usually with more abundant managerial and financial resources, in an increasingly globalised environment.

Figure 7.15: MDS Representation of External Constraints for International Operations (Non-Importers)



Trust

In respect of factors related to the *Trust* construct, the data plotted in the MDS Scalograms shown in Figures 7.16 and 7.17, for exporters and non-exporters, and in Figures 7.18 and 7.19, for importers and non-importers, respectively, reveals four distinct partitioning patterns of the MDS space in comparison with the results of the full sample.

As can be observed, three of the sub-groups, exporters, importers, and non-importers, display distinct groupings of variables in each of the facets that emerged in the MDS solutions, making the interpretation of these results complex.

Figure 7.16: MDS Representation of Trust (Exporters)

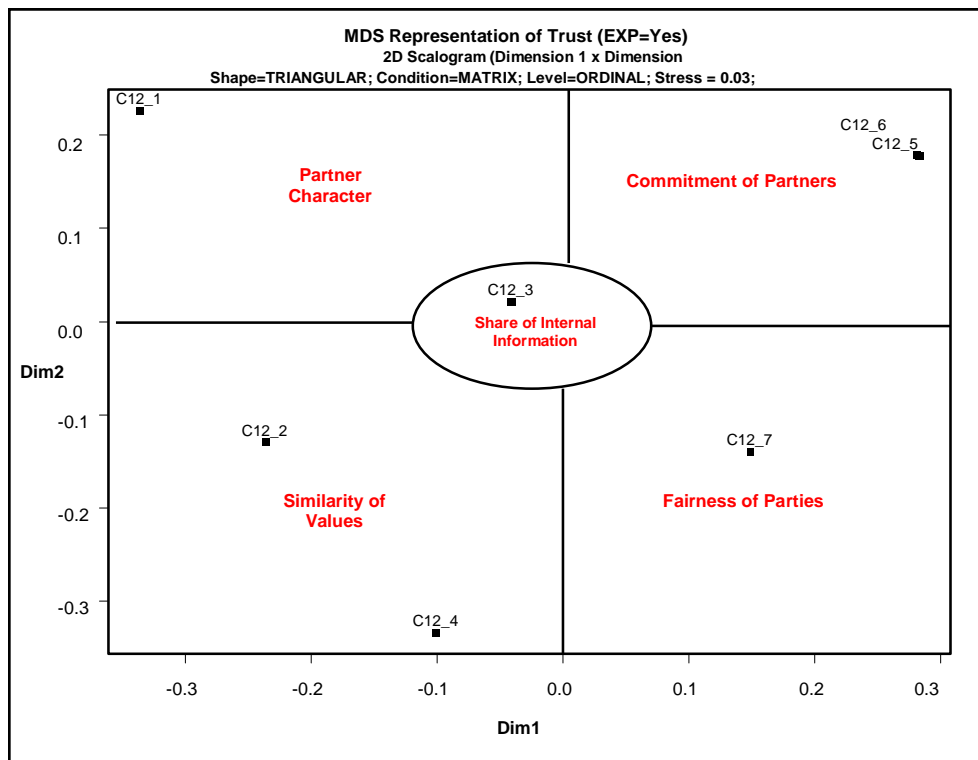


Figure 7.17: MDS Representation of Trust (Non-Exporters)

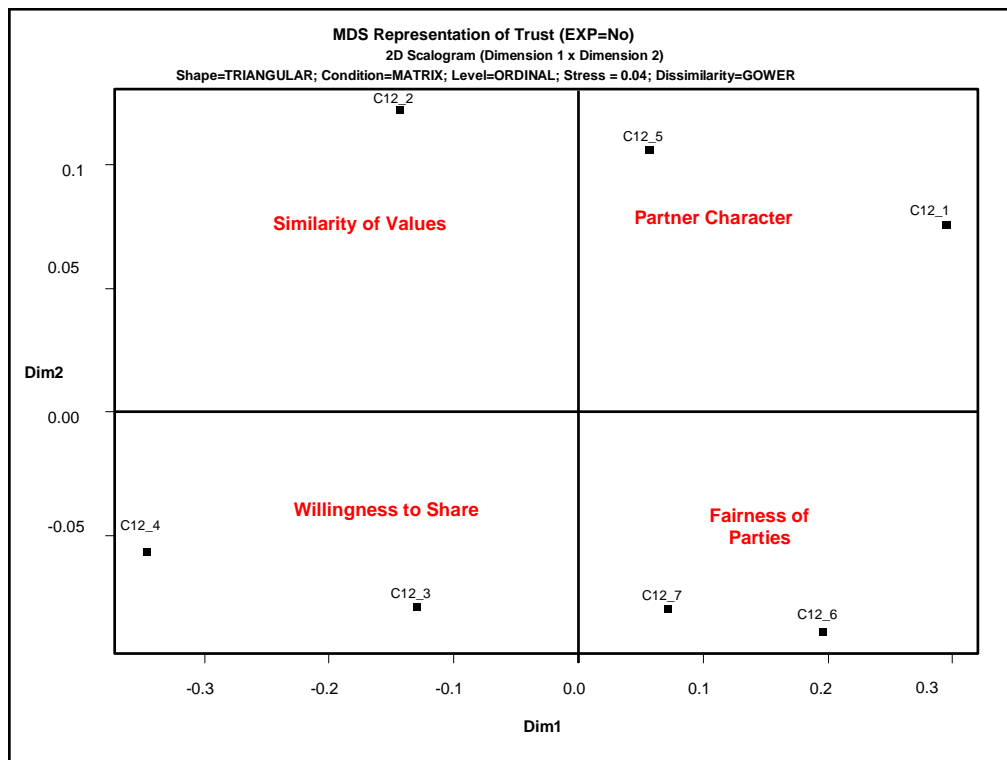


Figure 7.18: MDS Representation of Trust (Importers)

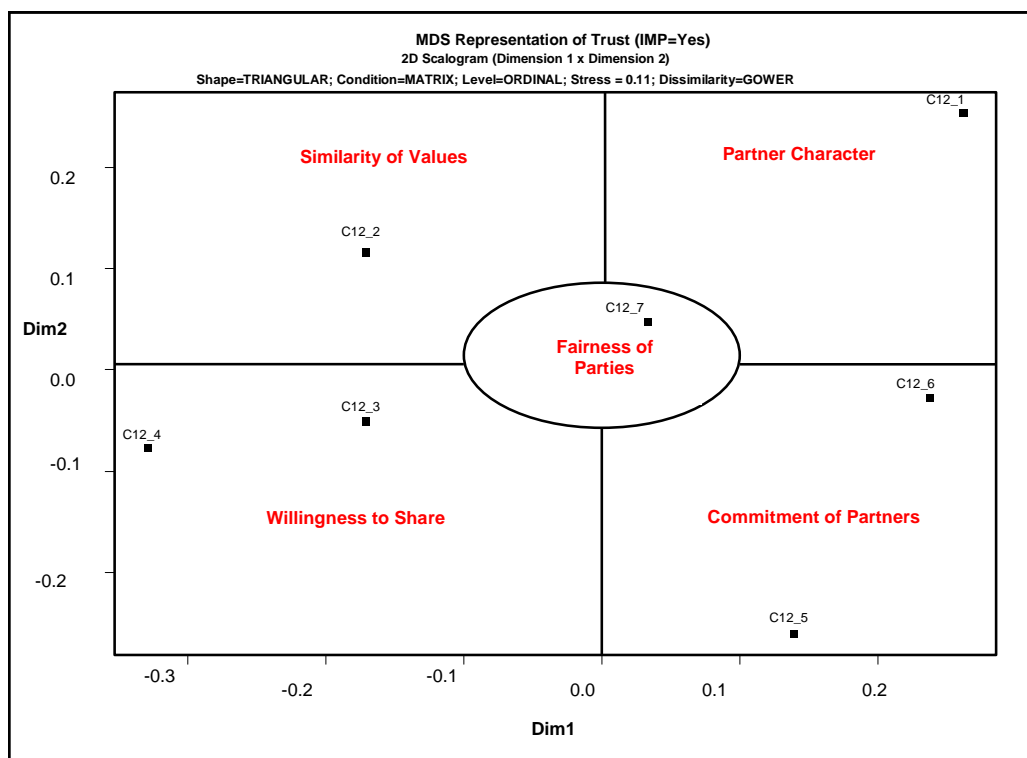
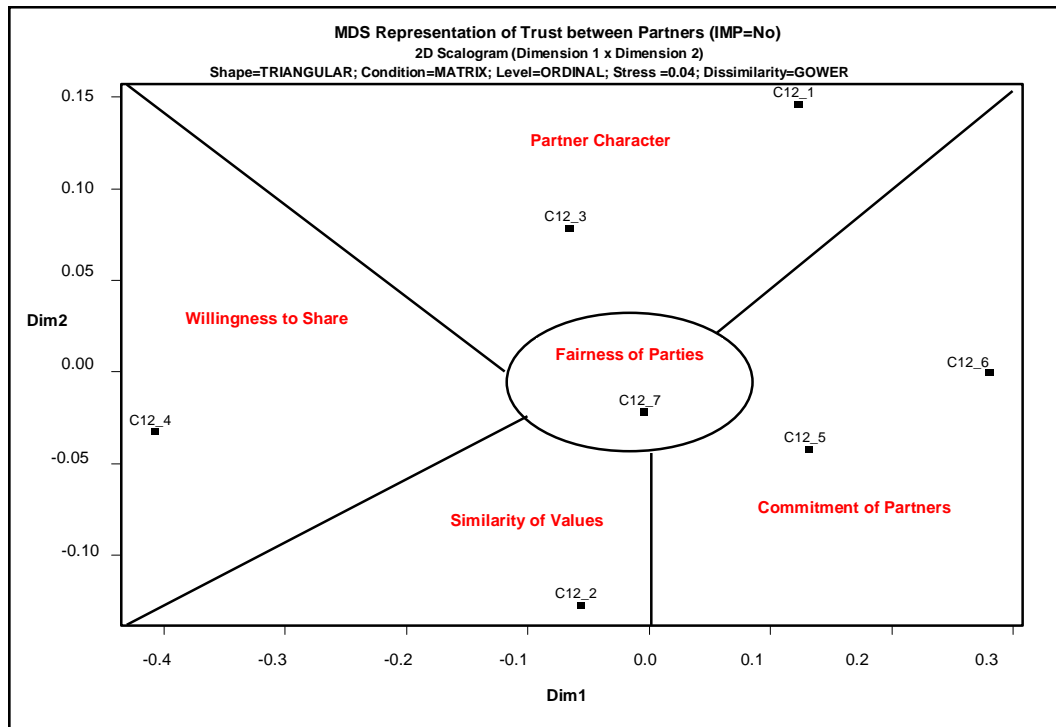


Figure 7.19: MDS Representation of Trust (Non-Importers)



Yet the configurations obtained in the MDS Scalograms of the *Trust* construct for both importers and non-importers, shown in Figures 7.18 and 7.19, respectively, display the same variable (C12_7) in the centroid region of the MDS map, labelled “Fairness of Parties”. Also, a distinct variable (C12_3) occupies the centroid location of the MDS Scalogram of Trust for the group of exporters, being labelled “Share of Internal Information”. In both groups, the variable located in the centroid region does not share particularly strong associations with the other variables in the plot.

The mixed results obtained in this MDS analysis of the *Trust* construct seem to indicate that, although the concept has long been established in research as one of the fundamental relational attributes that enable collaborative relationships in networks (Svensson, 2004; Spekman and

Carraway, 2006); the variables pertaining to this multi-item scale construct necessitate further validation. This finding also concurs with Svensson's (2004) argument that, after decades of increased interest in research studies, the construct of trust in business relationships and business networks still lacks a thorough development and rigid base.

Governance Mechanisms

The MDS solutions of the *Governance Mechanisms* construct for exporters and non-exporters are given in Figures 7.20 and 7.21, and for importers and non-importers in Figures 7.22 and 7.23, respectively.

Figure 7.20: MDS Representation of Governance Mechanisms (Exporters)

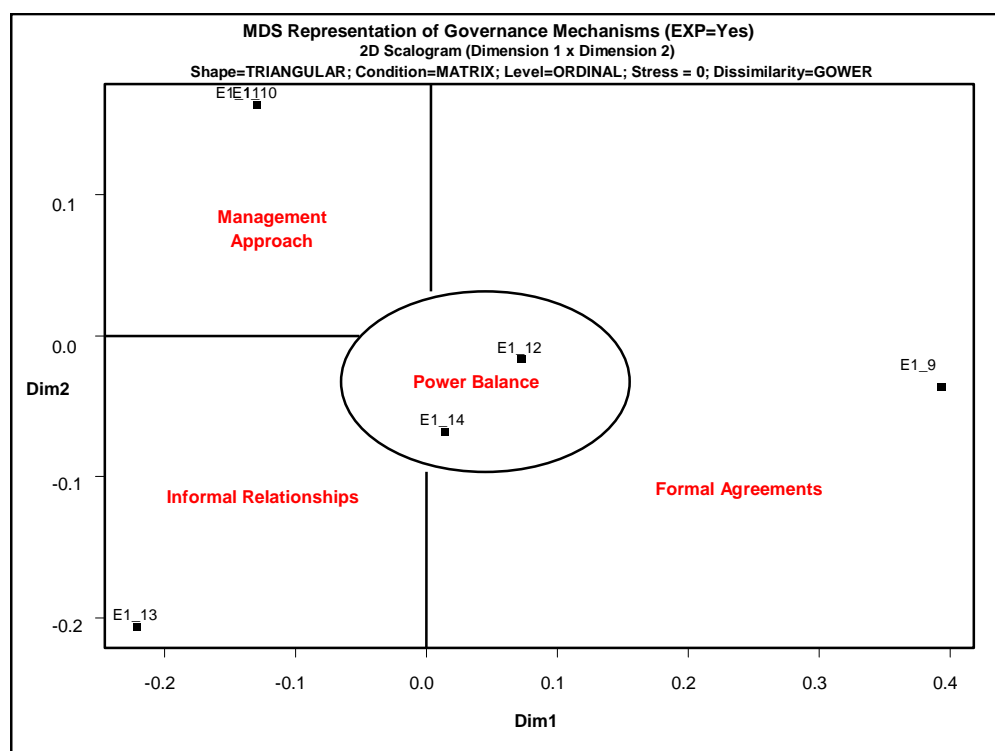


Figure 7.21: MDS Representation of Governance Mechanisms (Non-Exporters)

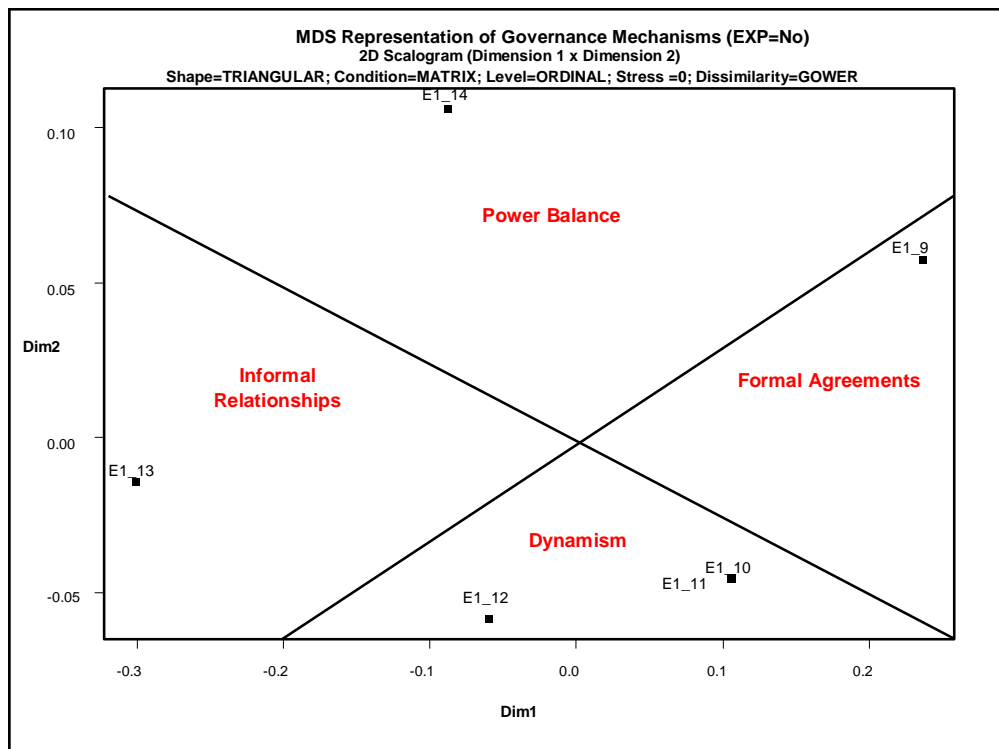


Figure 7.22: MDS Representation of Governance Mechanisms (Importers)

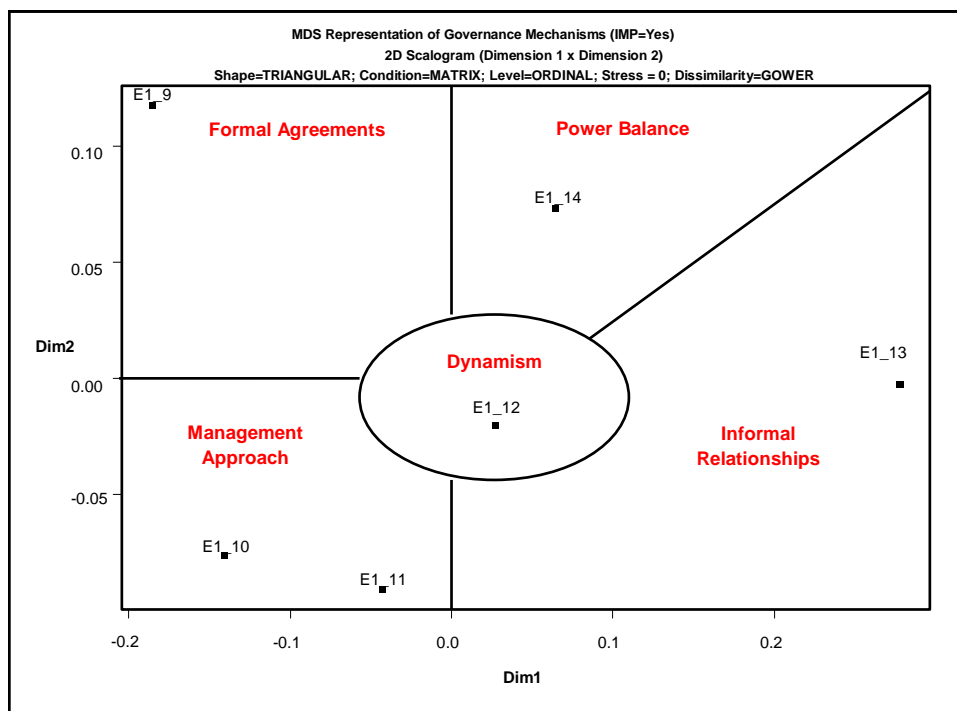
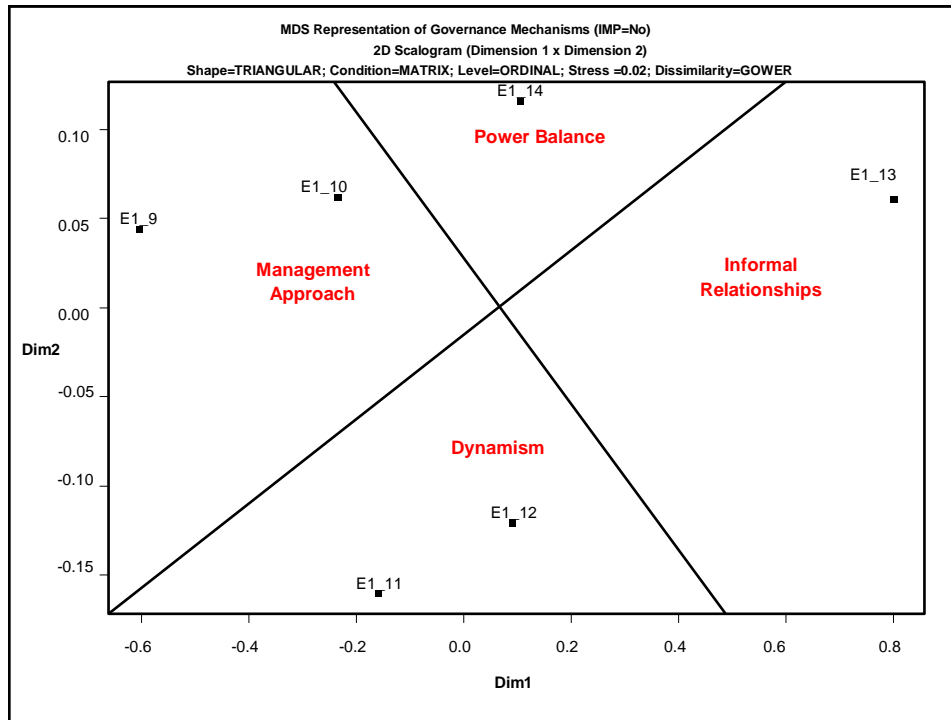


Figure 7.23: MDS Representation of Governance Mechanisms (Non-Importers)



It is interesting to note that two distinct partitioning patterns of the MDS space emerged in the MDS configurations: a combination of modular and polar patterns for both exporters and importers, in clear parallel with the MDS configuration of the *Governance Mechanisms* construct in the full sample; and a polar pattern for non-exporters and non-importers.

Besides the common partitioning patterns, the MDS plots of exporters and importers also reveal the importance attributed to balance of power between partners (E1_14) and the existence of quick decision making processes for the execution of complex tasks (E1_12), “glue” for the effective functioning of business networks. Further, as firms engaged in international exchanges, either on the export or import side, the entrepreneurs within these two sub-groups seem to have a stronger perception of the criticality of

relational norms to advance their own interests and objectives in business networks as well as for managing and safeguarding exchanges among business parties, consistent with Jones et al. (1997).

Networking Competences

The MDS solutions of the *Networking Competences* construct for exporters and non-exporters are given in Figures 7.24 and 7.25, and for importers and non-importers in Figures 7.26 and 7.27, respectively. Analysing the data plotted in the MDS Scalograms of these sub-groups it can be observed that the same polar pattern emerges as in the full sample, except for the exporters sub-group, which shows a combination of modular and polar partitioning.

Figure 7.24: MDS Representation of Networking Competences (Exporters)

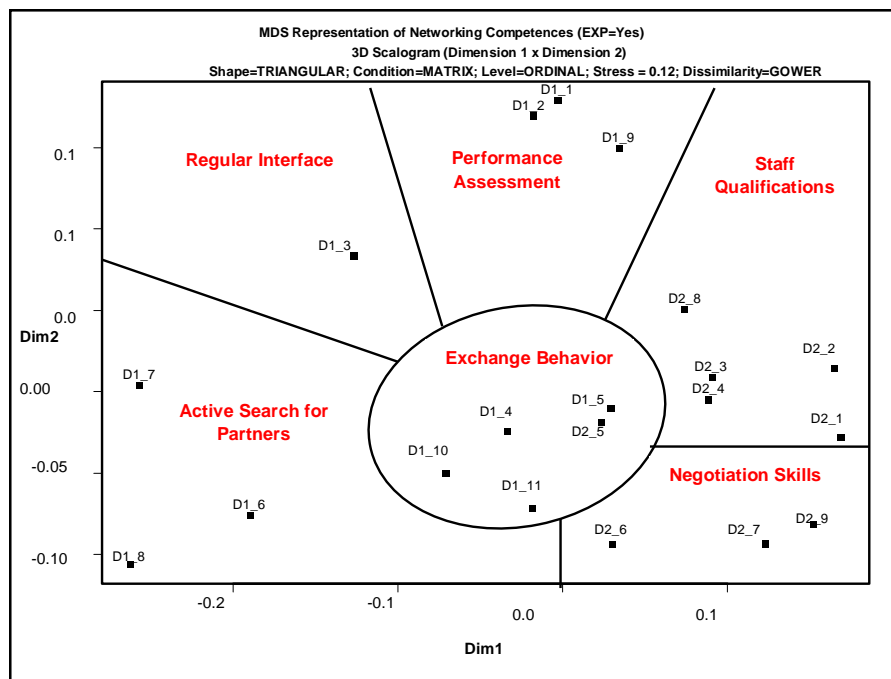


Figure 7.25: MDS Representation of Networking Competences (Non-Exporters)

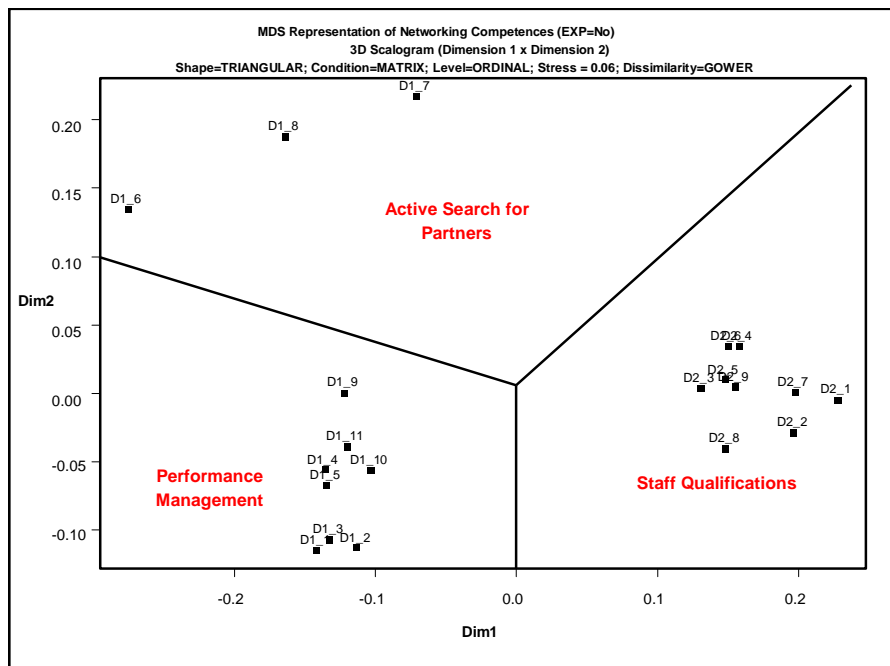


Figure 7.26: MDS Representation of Networking Competences (Importers)

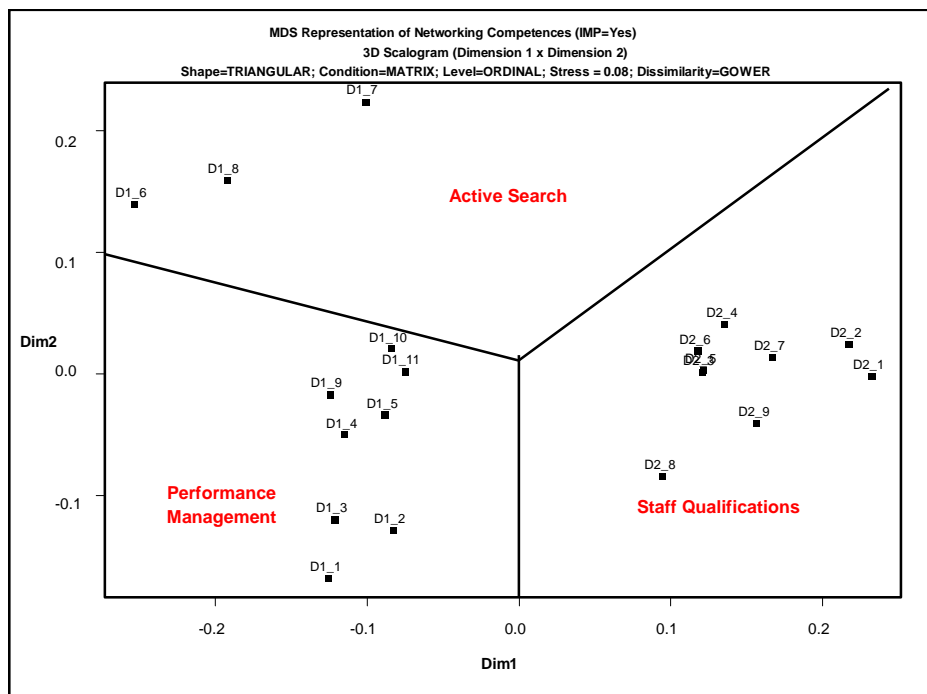
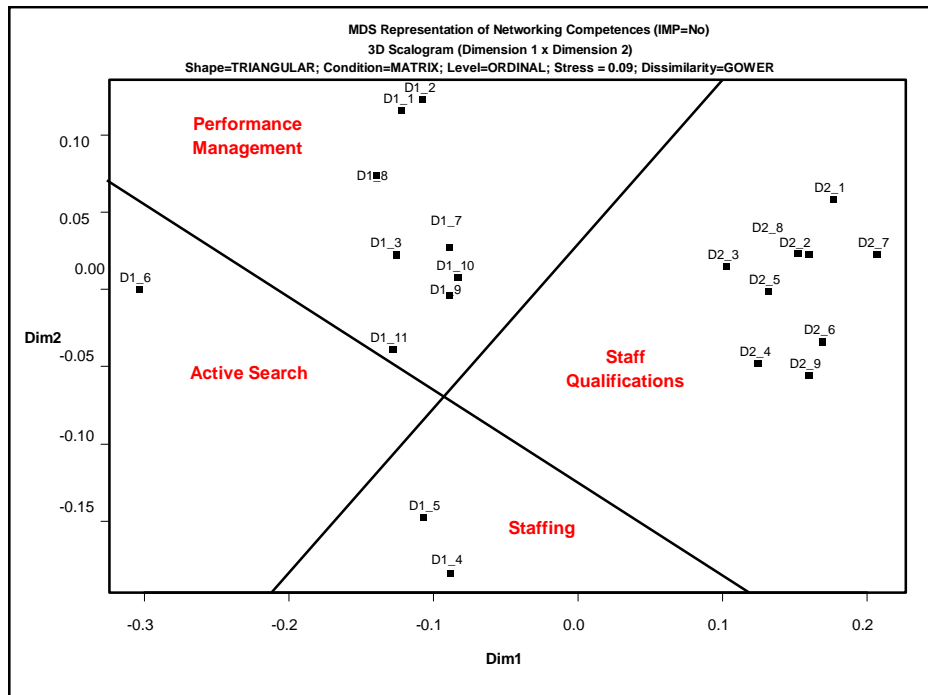


Figure 7.27: MDS Representation of Networking Competences (Non-Importers)



Overall, the graphical MDS representations of the sub-groups non-exporters, importers, and non-importers show consistency with the full sample results of the *Networking Competences* construct in terms of both the associations of variables and the interpretation of facets that emerged from the analyses, corroborating the scale developed and measured by Ritter et al. (2002). Nevertheless, a few aspects deserve attention about the analysis of the of the MDS plot of exporters (Figure 7.24).

First, the analysis indicates that more sub-settings of variables, with some different combinations of variables, appear than in the other sub-groups and in the case of the full sample. Therefore, the researcher labelled differently four of the six regions of the MDS map: “Regular Interface”; “Performance Assessment”; “Negotiation Skills”; and “Exchange Behaviour”. The other two regions replicate the full sample results: “Staff Qualifications” and “Active Search for Partners”. Second, a different set of variables (D1_4,

D1_5, D1_10, D1_11, and D2_5) appears near the centroid region of the map, in the region “Exchange Behaviour”. This result suggests that person- and firm-related exchange activities are relatively more important to understand the fundamental components of networking competences in the perceptions of exporters.

International Entrepreneurial Orientation

The MDS Scalograms of the *International Entrepreneurial Orientation* construct for exporters and non-exporters are given in Figures 7.28 and 7.29, and for importers and non-importers in Figures 7.30 and 7.31, respectively. The data plotted in the MDS solutions show the same combination of modular and polar patterns for the partitioning of the MDS spaces.

A few other commonalities between the sub-groups can be observed. First, it is possible to identify that three variables (F1_21; F1_22; and F1_23) appear to be associated with each other consistently across all sub-groups’ MDS plots generated, leading the researcher to label the region “Internationalisation Preparation”, as in the full sample Scalogram. This, again, corroborates the study of Knight (2001). Second, apart from the variable (F1_9) which appears isolated in the region “Effective Marketing” of the non-importers’ MDS map, almost all groupings of variables in the sub-groups of non-exporters, importers, and non-importers can be seen as associated with each other in the same regions. Third, although there are different centroid-based variables in each of the analysed sub-groups, one variable seems, both in the full sample and in all but one of the sub-groups’ results (non-importers), to be at the core of the *International Entrepreneurial*

Orientation construct, which is variable F1_13. This result confirms the importance of proactive opportunity-seeking behaviour, in the views of entrepreneurs taking part in this study, as an element of a firm's strong international entrepreneurial orientation.

However, looking at the MDS plots generated it can be observed that a few differences in perceptions of entrepreneurs exist in each of the four sub-groups. For example, among several entrepreneurial characteristics, the variable F1_16 shows an inconsistent pattern of association with other variables in distinct regions of the MDS plots. Also, in comparison with other sub-groups, the perceptions of entrepreneurs portrayed in the MDS map of exporters reveals a more "specialised picture" of the *International Entrepreneurial Orientation* construct, with clearer groupings of variables within distinct regions. Finally, the closer groupings of variables, labelled "Growth Strategy"; "Resource Orientation"; and "Competitive Aggressiveness", around the "Strategic Orientation" centroid region of the MDS map serve as a heuristic summary of entrepreneurial behaviour, showing that these aspects are the most distinct among entrepreneurs of exporting firms.

Figure 7.28: MDS Representation of International Entrepreneurial Orientation (Exporters)

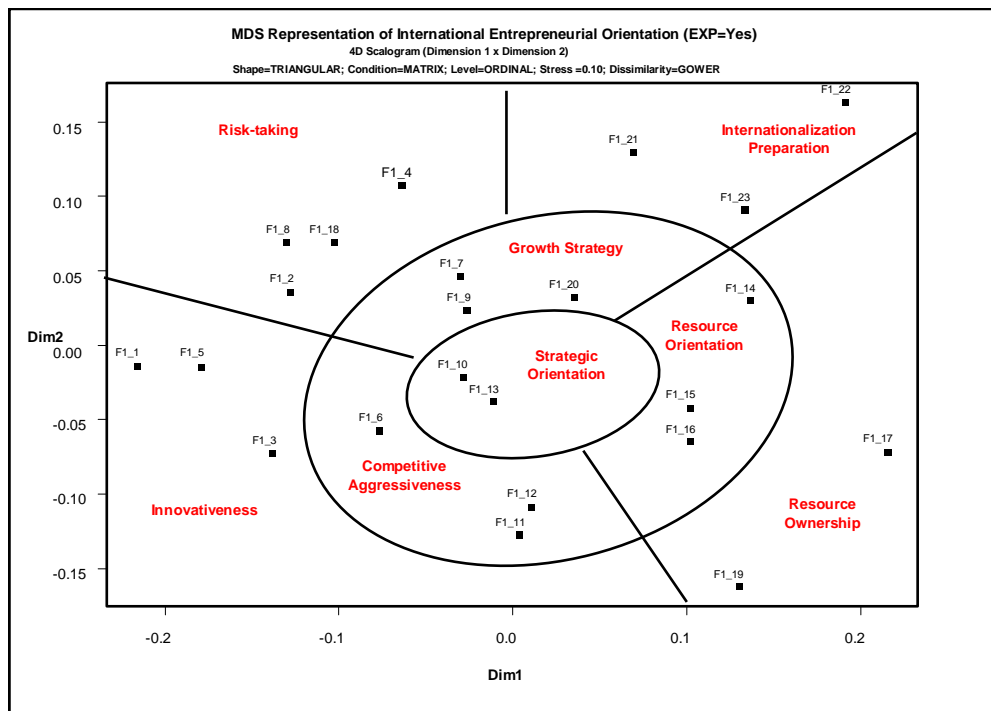


Figure 7.29: MDS Representation of International Entrepreneurial Orientation (Non-Exporters)

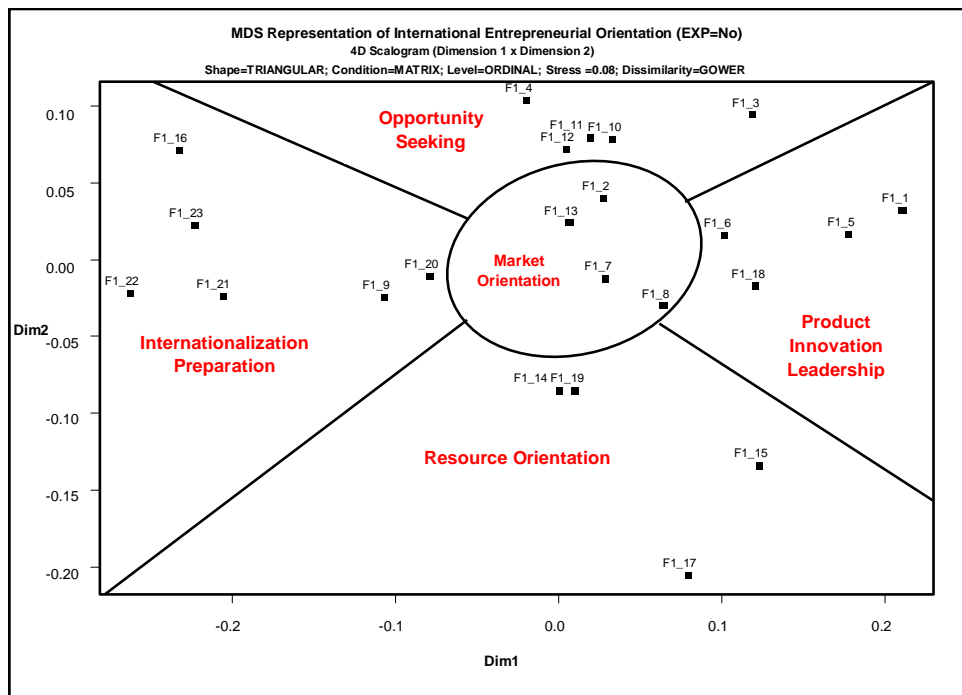


Figure 7.30: MDS Representation of International Entrepreneurial Orientation (Importers)

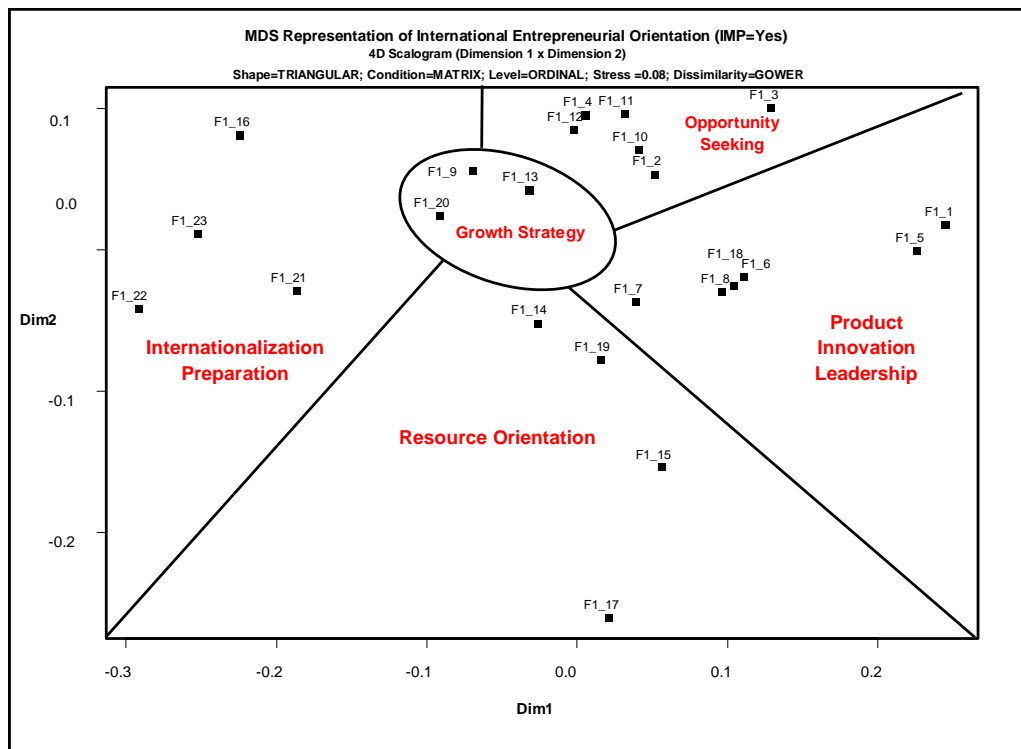
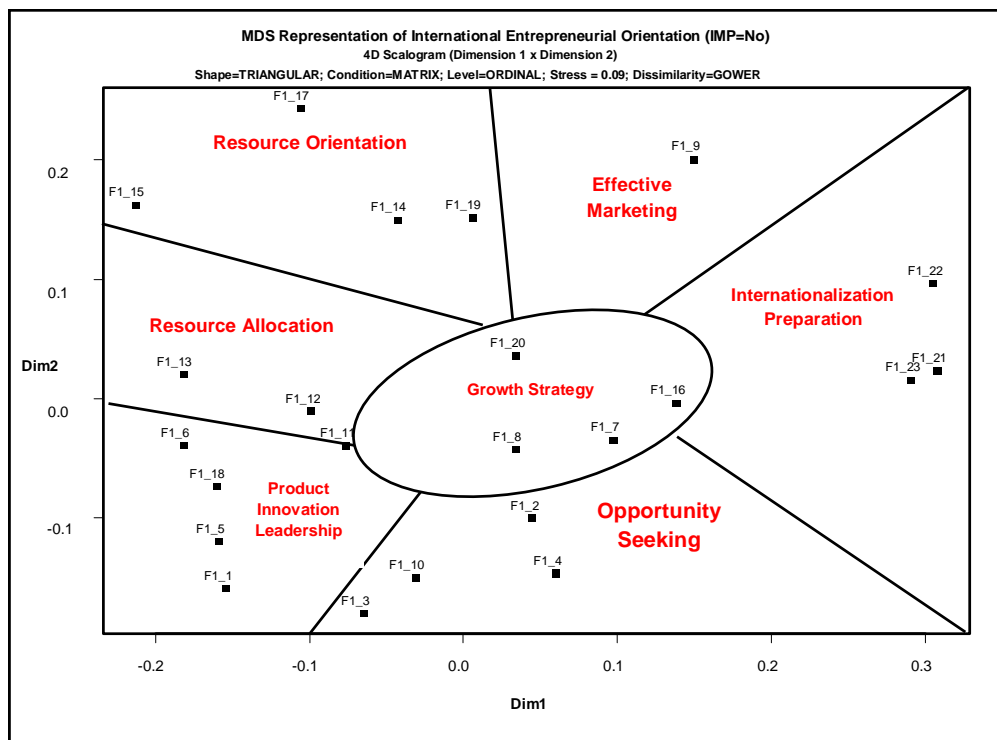


Figure 7.31: MDS Representation of International Entrepreneurial Orientation (Non-Importers)



International Experiential Knowledge

The MDS solutions of the *International Experiential Knowledge* construct for exporters and non-exporters are given in Figures 7.32 and 7.33, and for importers and non-importers in Figures 7.34 and 7.35, respectively. Analysing the data plotted in the MDS Scalograms of these sub-groups, it can be observed that a combination of modular and polar patterns emerges in the sub-groups of both exporters and importers; and a polar pattern emerges in the sub-groups of both non-exporters and non-importers.

Looking at the graphical representations resulting from the MDS analysis applied to this construct, a few comments can be made. First, the same variable (D8_1) appears alone in all sub-groups, similarly to the pattern observed in the full sample, with this distinct region of the MDS maps being labelled “Knowledge of Languages”. Second, in line with the MDS results for the full sample, the same association of variables (D8_3 and D8_4) appears consistently across three of the sub-groups (non-exporters; importers; and non-importers). The researcher labelled this region “Knowledge of Operations”.

Besides these commonalities, a few differences are worth mentioning. First, the region labelled as “Experience Abroad”, with variable D8_5, which emerged in the full sample analysis, reveals distinct configurations in the sub-groups of both exporters and non-exporters. It appears that “Experience Abroad”, in the case of these two sub-groups, is valued not for its own sake, but in association with other more operational elements of the internationalisation process, such as the establishment of subsidiaries or foreign affiliates outside Brazil (D8_3), in the case of exporters, or knowledge

of foreign laws (D8_2), norms, and customs, in the case of non-exporters. Second, in the configuration of the MDS maps shown for both sub-groups of exporters and importers, a clear centroid region emerges with “Knowledge of Standards” being at the core of the *International Experiential Knowledge* construct in the perceptions of entrepreneurs in these sub-groups.

The clear distinction of perceptions between entrepreneurs of firms that have either an outward or an inward internationalisation experience and entrepreneurs of firms which do not possess any kind of international exposure suggests that acquiring an adequate knowledge of the technical standards and commercial laws and norms that are specific to a foreign country market becomes more important as firms start to have an actual engagement in international activities. This seems to be particularly critical in the case of firms participating in this research study, which operate in a technical globalised industry such as software and allied services. In contrast, entrepreneurs of firms which do not possess any form of international engagement seem to have a more dispersed view of what kind of knowledge is needed to internationalise operations.

Figure 7.32: MDS Representation of International Experiential Knowledge (Exporters)

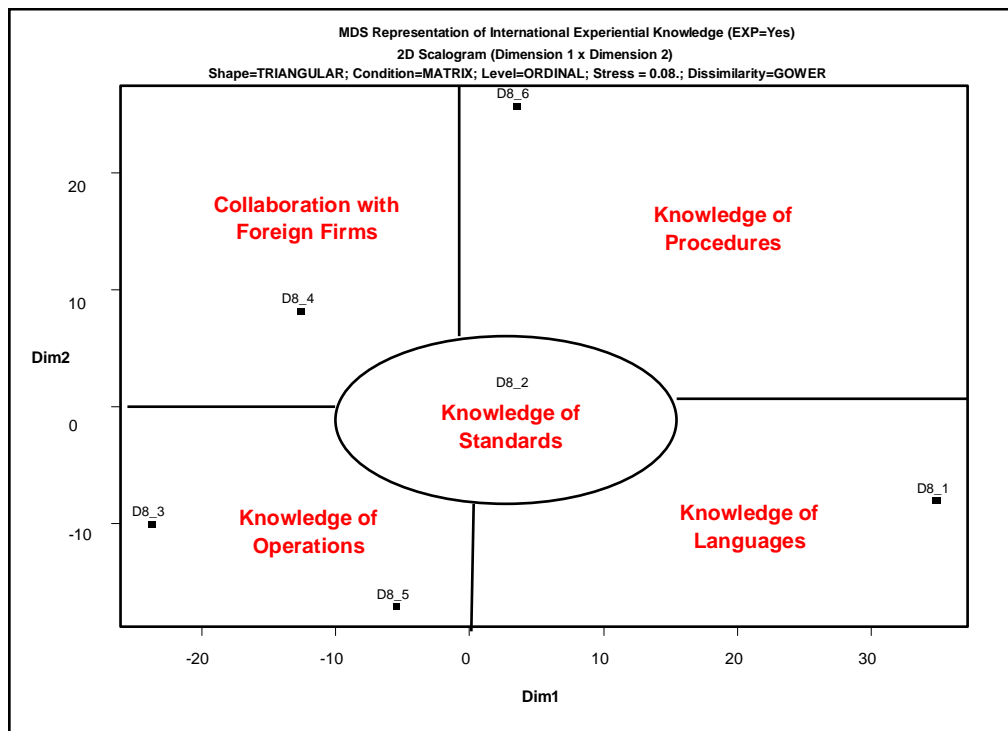


Figure 7.33: MDS Representation of International Experiential Knowledge (Non- Exporters)

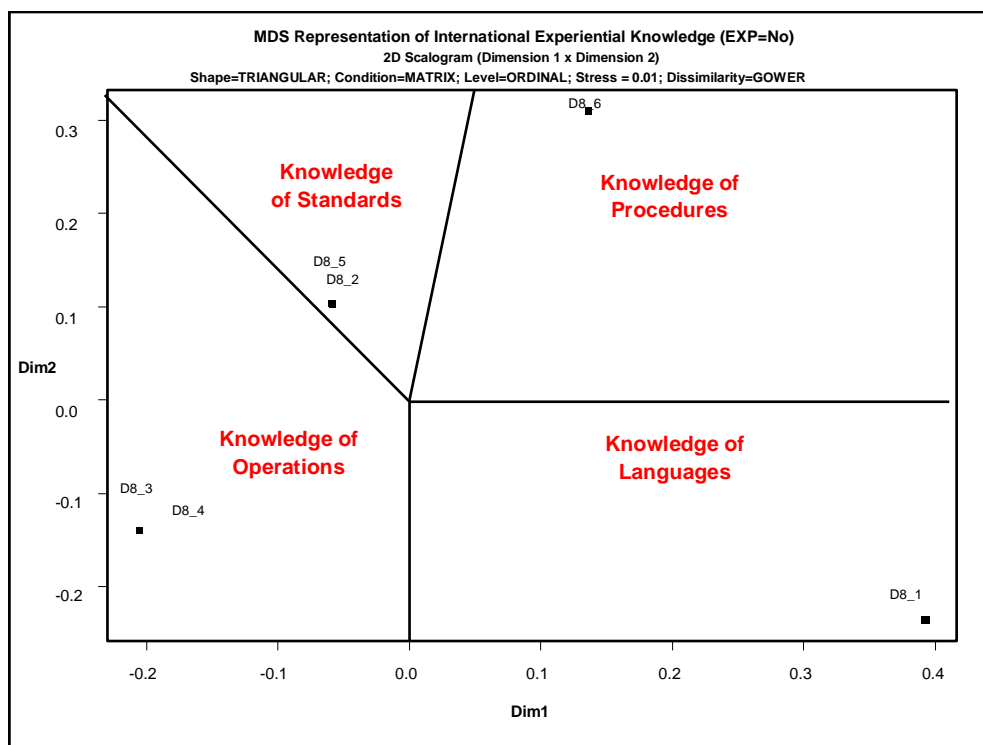


Figure 7.34: MDS Representation of International Experiential Knowledge (Importers)

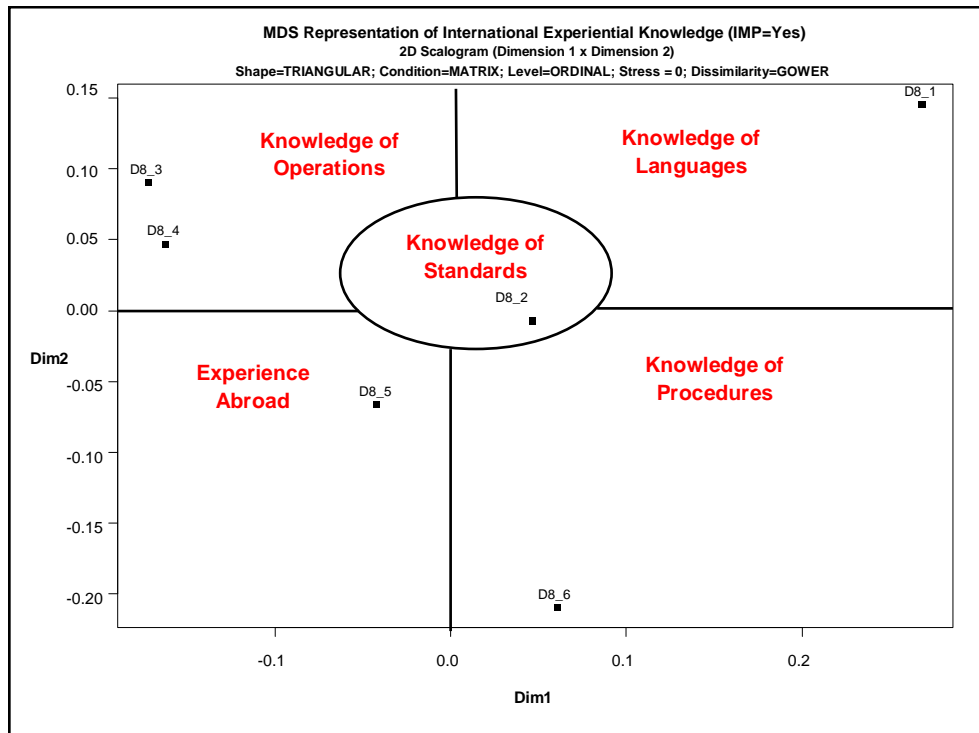
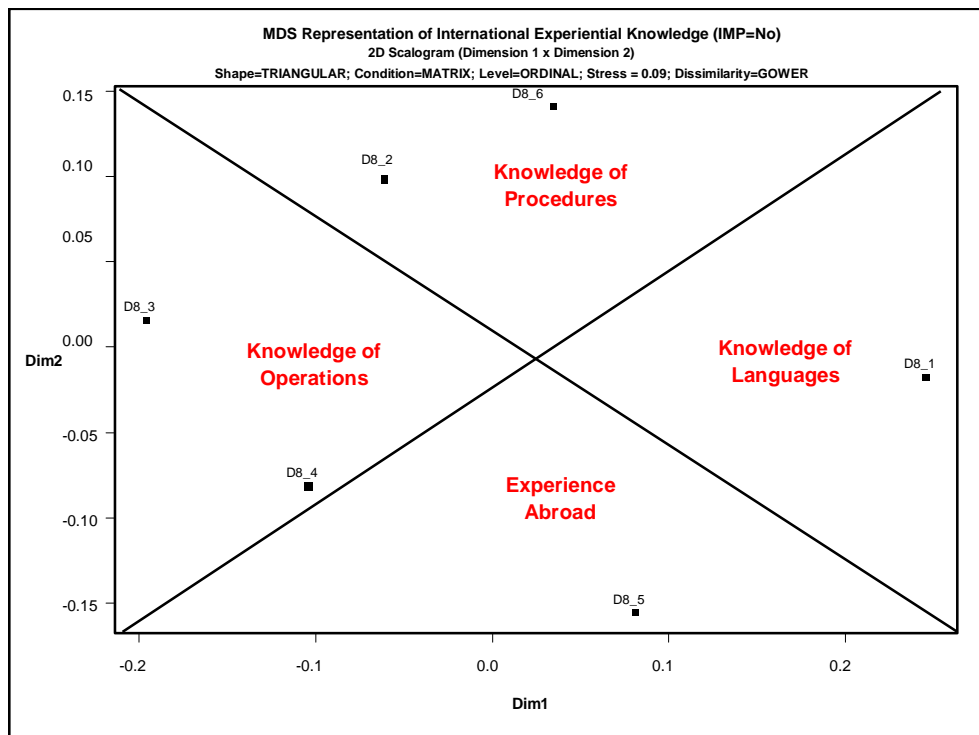


Figure 7.35: MDS Representation of International Experiential Knowledge (Non-Importers)



This result corroborates Eriksson et al.'s (1997) view of the importance of knowing about the institutional conditions of foreign markets, one of the components of the three kinds of knowledge put forward by the authors for the empirical investigation of the experiential knowledge concept. Also, this analysis confirms the differing perceptions among entrepreneurs in this study, depending on their experience in international operations, as regards the specific knowledge required in a particular market to detect the opportunities and reduce the uncertainties in situations when a firm needs to engage in foreign operations.

7.6 Concluding Remarks

The results presented in this chapter validate the exploratory qualitative approach used to supplement the quantitative findings of the logistic regression analyses discussed in Chapters 5 and 6. The chapter provided further empirical assessment of seven multi-item scale constructs of the nineteen constructs employed in this study.

Although the use of MDS is disseminated in various research domains, its application in international business research is not common. Thus the results obtained through the use of the MDS method in this study bring methodological contributions and offer richer insights into the nature of some of the key determinants of exports and imports investigated as explanatory variables in this study. Further, the researcher was enabled to identify unrecognised dimensions affecting the internationalisation behaviour of Brazilian software firms.

The representations resulting from the application of MDS analysis to the overall sample suggest that, given the complex nature of some constructs, there is a need for further empirical investigations of the constructs of governance mechanisms, networking competences and international entrepreneurial orientation as determinant factors affecting the internationalisation of firms.

The results of the split-sample approach applied also suggest that exporters and non-exporters as well as importers and non-importers vary considerably in the way they perceive several factors that previous research studies have pointed out as determinants of the internationalisation process of firms. Nevertheless, shared managerial perceptions exist between exporters and importers in respect to the importance attributed to components of governance mechanisms and external constraints for international operations.

It is important to emphasise, however, that the MDS solutions discussed in this chapter involve subjective judgments by the researcher. Due to its rather qualitative character, the results discussed in this chapter are therefore to be viewed with some caution. Moreover, absolute distances between points visualised in the MDS configurations should be taken figuratively, not literally, as they represent only relative distances.

Having reported the empirical results of this study in Chapters 5, 6 and 7, the next and final chapter presents the discussion and conclusions that can be drawn from our investigation, as well as the contributions and limitations of the study, and suggestions for further research.

Chapter 8: Discussion and Conclusions

8.1 Introduction

This study's primary objective was to assess the impact of business-network collaboration on the internationalisation of firms in the software industry through an empirical analysis of survey data in Brazil. Within this general objective, an integrative theoretical framework was built and tested empirically to examine the influence of factors in four dimensions – contextual, organisational, network and entrepreneurial – on the international engagement, through exports and imports, of software firms in an attempt to bring together several aspects not thoroughly researched before.

The purpose of this final chapter is to discuss and integrate the main findings of Chapters 5 and 6 with regards to the research questions and hypotheses in a way that, combined with the literature reviewed in Chapter 3 and the MDS results in Chapter 7, will provide a fuller understanding of the internationalisation of Brazilian software firms. In doing so, conclusions are drawn. To accomplish these purposes, the chapter is divided into four major sections. Section 8.2 presents the main findings of the study by answering the research questions. Section 8.3 outlines the contributions of the study. Then, in Section 8.4, a discussion of implications for policy and business practice is outlined. The chapter ends with a discussion in Section 8.5 of the limitations of the study and of future research directions.

8.2 Findings on Research Questions

The purpose of this study is to capture the impact collaborative strategies through business networks may have on the internationalisation of software firms in Brazil, as formulated in the central research question:

Central Research Question: *To what extent, and in what ways, does business-network collaboration impact on the internationalisation of software firms in emerging countries?*

Before discussing the principal findings of the thesis, the link between exports and imports, as two measures of internationalisation adopted in this study, needs to be reviewed against the empirical results. As argued in Chapter 3, the adoption of the two dependent variables, imports and exports, is considered adequate to an approach in which more complex modes of international behaviour are considered, involving both inward and outward international activities. Furthermore, international exchange through inward-driven purchasing decisions by domestic firms may lead to subsequent forms of outward international activities and vice versa, as argued by some researchers (Korhonen et al., 1996; Karlsen et al., 2003; Tucci, 2005).

This argument is supported empirically in this study, as the results of a Fisher's exact independence test has shown a highly significant association between imports and exports ($p=0.0025$). Further, the paired Student's *t*-tests carried out also confirm the interplay between imports and exports, as revealed in Figures 4.9 and 4.10. Ever having exported increased 1.3 times the likelihood of a firm's importing, while ever having imported increased four

times the likelihood of a firm's exporting. Nevertheless caution needs to be exercised in the causal ordering of this association as this is not a longitudinal study.

The findings discussed above substantiate the importance of investigating the internationalisation of firms as a two-sided phenomenon, through the combination of import and export operations. Thus, considering these findings, the internationalisation of 148 software companies in the sample can be characterised by exporting and importing activities.

Having established in this research the empirical grounds for the association between the two trade-related internationalisation activities of exports and imports, the discussion moves on to answering the set research questions.

In order to answer the central research question, we need to examine the extent of internationalisation of software firms. This will be done by evaluating the first specific research question of this study:

RQ1. What is the extent of internationalisation of Brazilian software firms?

8.2.1 The extent of Internationalisation of Brazilian Software Firms

In order to assess the extent of internationalisation of Brazilian software companies, we examine their international behaviour in two broad areas: (1) levels and scope of internationalisation; and (2) strategies.

(1) First, looking at the levels of internationalisation, the descriptive statistics provided in Table 4.15 reveal that Brazilian software firms are predominantly engaged in some form of international activity, either through

importing or exporting activities (70 percent of surveyed firms). This international engagement consisted mainly of importing activities in 2005 (52 percent of firms), while only 18 percent of firms reported exporting activities in the same year. This was also illustrated in Table 4.16 by the significantly higher average proportion of foreign acquisitions to total supplies acquired in 2005 (28 percent) in comparison to the results for outward-driven activities, represented by the average share of sales to international markets in 2005 (18 percent).

A possible explanation for this result could be the existence of a large domestic market for the Brazilian software industry in both the private sector, with leading sectors such as banking and telecommunications demanding the development of sophisticated products and services, and the public sector. The predominant inward pattern of internationalisation of software firms found in our study is consistent with the findings of previous studies on the software industry in Brazil (Dedrick et al., 2001; Botelho et al., 2005; Roselino, 2006a). These studies, by examining the evolution of the industry since its beginning in the 1970s, have found the development path of Brazilian software enterprises grounded in the domestic market. This is in accordance with Madsen and Servais (1997) who state that firms in nations with large domestic markets have a lower propensity to become “born-globals”, confirming the impact of the national setting on a firm’s internationalisation. Finally, this empirical study reveals that the internationalisation level is even lower in both inward and outward activities in the case of micro and small firms (Figure 4.11).

Nevertheless, it is important to stress that examining the internationalisation developments of software firms in the period 2003-2005 from both inward and outward perspectives; a trend towards more outward driven internationalisation activities is suggested in our findings. Statistical testing revealed significant results equally for the increase in the number of exporting firms and the increase in mean values of sales to international markets ($p\text{-value} < .05$, Wilcoxon Matched-Pairs Test). This finding is in line with a study by Softex (2009) which shows that the growth rate in revenues from foreign markets of Brazilian software firms rose on average 53 percent per year in the period 2003-2006.

It is also noteworthy that a pattern of early outward internationalisation of surveyed firms emerges. Among the internationalised firms, 50 percent had achieved their first international sales to foreign markets within the first five years of operation. As such, this result confirms the findings of empirical studies on the internationalisation of high-tech firms in developed economies (Hashai and Almor, 2004; Spence and Crick, 2006; Ojala, 2008). The belief that early internationalisation may confer substantial benefits in terms of knowledge acquisition about international markets and how to succeed there has been emphasised in a study on born-global firms by Knight and Cavusgil (2004).

The above-discussed finding offers therefore evidence that the early internationalisation of technology-based firms in emerging economies may not differ considerably from those firms in developed countries. Thus, industry-specific factors may play a more critical role than prior research on internationalisation has suggested. Placing this finding into context, this is an

area of consideration for policymakers in emerging economies. Arguably, there is a need to address tailored-support measures for assisting the internationalisation of entrepreneurial software firms in earlier stages of establishment.

Although remaining an undetermined question, the speed of internationalisation might be a factor leading to superior performance of high-tech firms as some studies have suggested (Crick and Spence, 2005; Zahra, 2005). Therefore, tailored-support measures for the internationalisation of young entrepreneurial software firms might have a positive impact on leveraging the speed and the achievement of superior performance in dynamic, high-tech international markets. Also, these measures for newly established software firms might fill a gap which is addressed by Botelho et al. (2005), who note that supportive policy instruments for the software industry in Brazil are still restricted to a few financial incentives.

Turning our attention to the scope of internationalisation of software firms, the findings show that geographically or culturally close markets such as South America, followed by USA and Canada, and the European Union represent the most frequent geographical foreign markets companies sell to. This finding is consistent with studies on the importance of psychically close markets in the initial stages of export development of smaller firms in the software industry in Finland, Ireland and Norway (Bell, 1995), and New Zealand (Coviello and Munro, 1997). More recently, studies have also confirmed these international growth patterns of software firms in Finland (Erkko et al., 2002) and Ireland (Garvey and Brennan, 2006). Two lines of

explanation found in the international business literature can be drawn on to explain this result.

The Uppsala model of incremental internationalisation (Johanson and Vahlne, 1977) asserts that companies expand operations into international markets first to countries with a low psychic distance. On the other hand, more recently, another group of studies have questioned the Uppsala model's focus on the explanatory variable of psychic distance by examining the extent to which it influences the market-entry choices of high-tech firms.

Although not rejecting the psychic distance concept totally, these studies have acknowledged the importance of other factors such as customers' followership, niche markets, industry-specific characteristics (Bell, 1995), past experience of founders and partners (Madsen and Servais, 1997), social capital (Arenius, 2005), established international networks in particular countries, the targeting of key niche markets (Crick and Spence, 2005), and management perception of cultural differences (Ojala, 2008) in the market-entry choices of international entrepreneurial firms. For example, Bell (1995) argues that the internationalisation of smaller software firms is influenced by domestic and client followership as opposed to the psychic proximity of export markets.

(2) Second, looking at the strategies and modes of international representation adopted, the results reveal that the formulation of internationalisation strategies in a planned manner is scarce among the surveyed software firms and they make very little use of more committed forms of market entry such as subsidiaries, affiliates, or joint ventures.

Taking into account the commonly recognised characteristics of smaller firms, notably their fewer financial, human, and tangible resources compared to larger enterprises (Carson and Gilmore, 2000; Knight and Cavusgil, 2004), a research study by Crick and Spence (2005) in the international entrepreneurship area suggests a possible explanation for our finding. They argue that strategy formation in high-tech smaller firms may range from planned to unplanned opportunistic international behaviour and that entrepreneurs operate a series of emerging strategies as a result of international opportunities that are presented by chance.

Following the discussion of the extent of internationalisation of software firms in Brazil, we can move on to examine the other specific research questions (RQ2-RQ4) and the set of hypotheses of the study related to each of them. Consequently, the results of two sets of logistic regressions with the overall sample reported in Chapters 5 and 6 are used for the discussion of determinants of exports and imports, the outward and inward elements of internationalisation investigated in this research. The results of the multidimensional scaling (MDS) analysis discussed in Chapter 7 are also used to provide some insights into the associations of relevant components of key explanatory variables perceived by entrepreneurs participating in this study.

Additionally, using further logistic regression examinations, differences between smaller firms and larger firms are discussed. It is expected that the integrated assessment of these findings will provide the answer to the central research question of the study.

8.2.2 The Impact of Business Network Collaboration Strategies

The first aspect of the central research question examines the extent to which network strategies have an impact on the internationalisation of software firms, embracing the second research question:

RQ2. To what extent is the internationalisation of Brazilian software firms driven by collaboration through business networks?

The logistic regression results of this study suggest a significant, positive influence of the participation in business networks on the outward aspect of internationalisation, exports. This result thereby adds to the knowledge about this phenomenon by bringing quantitative support to qualitative findings reported by a number of network studies in the international business literature (Coviello and Munro, 1997; Fletcher and Barrett, 2001; Chetty and Wilson, 2003; Vissak and Roolah, 2003; Glöcker, 2006).

A recent study by OECD (2009) concludes that due to the technologically heterogeneous and complex nature of software functionalities, collaborative activities are playing an increasingly important role in improving and widening linkages, including internationally, of software firms. It can be inferred, therefore, that, as the software innovation process has become more global, business-network collaboration has become a critical mechanism through which software firms can draw upon external resources to deliver innovative products and services in both the domestic and international markets.

In contrast, the association between participation in business networks and imports was not significant. As such, this result is in contrast with qualitative findings provided by Bjorkman and Kock (1997) on the importance of the entrepreneurs' networks on the inward internationalisation of service firms. Based on these findings, it can be concluded that the impact of collaboration through business networks on internationalisation, as investigated in *Hypothesis 4*, is supported for exports only.

8.2.3 Network Factors Explaining Software Firms' Internationalisation

Having discussed the impact of business network collaboration on software firms' internationalisation in the previous section, this section seeks to advance the discussion by evaluating the third research question:

RQ3. *What are the factors that explain the effect of business networks on Brazilian software firms' internationalisation?*

The *Network Dimension* in the integrative theoretical framework of this study provides a particular lens with which to look at the factors that may explain the effect of collaboration through business networks on the internationalisation of software firms. Thus, the discussion of the third research question will focus on the results of *Hypotheses 5 to 8*, examining the effect of factors related to the *Network Dimension*.

Previous studies (Wright et al., 2002; ENSR, 2003; Hau and Evangelista, 2007) assert that foreign partners might provide the necessary managerial capabilities, international market access and expertise, resources, and facilitating conditions for acquiring valuable marketing knowledge. In contrast, the results of the logistic regression analyses of this research suggest that collaboration with foreign partners unexpectedly had a negative and significant effect, though of very low magnitude, on exports, while a non-significant effect on imports was found.

One possible explanation for the negative effect of collaboration with foreign partners on exports may be that the motives for and the benefits of links developed with foreign partners are of a distinct nature from the theoretically hypothesised effect. Alternatively, the negative effect could also be due to the fact that the positive impact of participation in business networks on exports, as the regression results in the full sample show, suggests that market power and the necessary resources are conferred by the participation of a firm in networks, reducing the effect of the establishment of direct connections with foreign partners to facilitate internationalisation of operations. This rationalisation is in accordance with the work by Elango and Pattnaik (2007) who, drawing on a sample of Indian firms, found that the beneficial role of foreign partners for internationalisation seems to be higher for local firms lacking market power. Thus, this finding does not provide complete evidence, in the context of an emerging economy's country, that developing relationships with foreign partners may help a firm in its internationalisation process. The above findings therefore support *Hypothesis 5* only for exports.

For *Hypotheses 6a, 6b and 6c* the findings from the Spearman Correlation analyses suggest that trust, commitment, and capabilities of partners, respectively, perceived as important factors in business networks by a firm, were not significantly associated with exports, while a negative and significant association between capabilities of partners and imports existed. These results are in contrast with previous studies which recognise the importance of trust (Hakansson and Snehota, 1995; Johnsen and Johnsen, 1999; Svensson, 2004; Brunetto and Farr-Wharton, 2007), commitment (Spekman et al., 1997; Helfert et al., 2002; Spekman et al., 2006) and capabilities (Sherer, 2003) as behavioural dimensions of network relationships that foster internationalisation. The mixed results obtained in the MDS analysis of the trust construct in Chapter 7, in combination with the statistically non-significant regression results, may indicate the need for further validations of the variables pertaining to this multi-item scale construct, an explanation in line with what some authors have stressed about the lack of a thorough development of the construct of trust (Svensson, 2004). Hence we can conclude that *Hypothesis 6c* was supported only for imports.

The finding of the Spearman correlation analysis shows that interdependence between network partners has a positive and significant effect on the outward element of internationalisation, exports, as *Hypothesis 7* proposed. However, this association does not hold true for the inward element of internationalisation, imports. Although specifically focused on interdependencies among network partners, associated with access to resources of and complementarity of technical and business activities

through relationships between partners, this finding is somewhat in line with previous arguments that cooperative interdependencies affect selling partnerships (Smith and Barclay, 1999), supply-chains networks (Svensson, 2002; Dubois et al., 2004), subsidiary performance across international operations (Subramaniam and Watson, 2006), and buyer-supplier relationships (Caniëls and Gelderman, 2007).

The regression results were not significant to suggest any impact of the existence of governance mechanisms in business networks on either of the two aspects studied in the internationalisation of software firms, exports and imports, as proposed in *Hypothesis 8*. This finding is at variance with the notion of the importance of governance as a regulating mechanism for firms engaging in international exchanges suggested in some previous studies (Svensson, 2004; Brunetto and Farr-Wharton, 2007).

In summary, the results obtained in the full sample reveal that, among the explanatory variables drawn from the network literature, two factors have significant impact on the internationalisation of software firms: interdependence between partners, with a positive effect on exports, and capabilities of partners, with a negative effect of on imports.

8.2.4 Combined Effect of Factors

Applying the study's integrative framework, the fourth research question attempted to shed more light on the impact of factors at four different dimensions on the internationalisation of software firms:

RQ4. *Can factors related to the four dimensions examined in this study be used to explain differences in the internationalisation of software firms?*

Having examined the factors at the *Network Dimension* in the previous section, we now move on to examine factors at the *Contextual*, *Organisational* and *Entrepreneur*-related dimensions.

Contextual Dimension-related Factors

A key finding of the research is that the institutional connectedness of a firm positively affects exports, suggesting that access to, and interaction with, the various levels of institutional, policy and technological networks fosters the internationalisation of a firm. The significance of institutional linkages found in our study, as proposed in *Hypothesis 1*, is in line with empirical findings by Yiu et al. (2007) who found a stronger effect on the international venturing of emerging-economy firms of links with dominant domestic institutions than of the ties established with domestic business networks. This finding was different for imports, as no significant association was found between the inward element of internationalisation and the institutional connectedness of a firm.

In addition to examining the institutional linkages of a firm in the context in which operates, an attempt has been made to assess whether the geographical concentration of firms affects the existence of exports and imports by software firms, as suggested in *Hypothesis 2*. Contrary to our expectation, no statistically significant effect of the geographical concentration of firms in a territorial area on the likelihood of

internationalisation of firms could be verified in the full sample, neither for exports nor for imports. In this respect, this finding contradicts the propositions found in the industrial-districts and public-policy literature (Meyer-Stamer, 1999; Schmitz, 1999; Pietrobelli, 2002; Pietrobelli and Rabellotti, 2006) on the greater propensities for jointed actions between networked firms occasioned by location in one place or geographical region as a critical mechanism in fostering the competitive advantages of firms in domestic and international markets. A critical view has been put forward more recently by some researchers, arguing that social networks are not necessarily localised in geographical proximity and that the latter cannot be considered a sufficient condition for the exchange of knowledge and innovation (Boschma, 2005).

Industry-specific factors may provide a possible explanation for this unexpected finding. The way business actors in the software industry are connected to each other may differ from other sectors. The technology-intensity of this industry may facilitate geographically-spread exchange processes through the use of information and communication technologies (ICT) and internet-based tools which might replace the effect that the establishment of joint activities between spatially embedded firms may have on the international engagement through exports and imports of software firms. This line of explanation is in accordance with the work by Baldoni (2001), who suggests the positive impacts of ICTs on the development and management of new models of collaborative networks between firms from sectors with a high level of technological complexity and technical skills.

One important lesson can be drawn from this finding. This result seems to address the distinction that needs to be made between geographical proximity and “intellectual proximity” for enterprises based on knowledge-exchange processes when looking at the effects proximity may cause on internationalisation through business-network collaboration in a knowledge-intensive industry such as software. Collaborative arrangements through business networks aimed at internationalising operations, will not necessarily happen among neighbour firms, contrary to what has been identified in the mainstream industrial-districts literature which, with few exceptions, has paid little attention to non-local linkages as important resources for remaining internationally competitive. In this respect, empirical evidence for this assertion has been found in a case study on footwear firms in the southern district of Barletta, in Italy, done by Boschma and Ter Wal (2005), in which increased performance was observed among firms having knowledge relationships beyond the district’s boundaries.

The results obtained in the Spearman correlation analysis in the overall sample show that the internationalisation of a firm is influenced by the perceptions of the entrepreneur and decision-maker, as considered in *Hypothesis 3*. The study’s overall indicator of a firm’s constraints for international operations shows a negative and significant association between this indicator and exports, while a negative and only marginally significant association with imports was found. This finding indicates the influence of the environment as perceived by the entrepreneur in such a way that the attitudinal patterns of entrepreneurs and decision-makers of a firm are likely to influence its internationalisation patterns, in particular for those

firms of smaller size, given the crucial role of the entrepreneur in such firms (Lloyd-Reason and Mughan, 2002; Pett et al., 2004).

Although this finding is not surprising, the MDS analysis has shown interesting and additional insights into the focal role attributed by entrepreneurs of both exporting and importing firms to governmental actions in the presence or reduction of many structural impediments, such as the general lack of experience abroad, for the development of their firm's internal operations. Furthermore, the finding in the MDS analysis suggests the critical importance of constraints perceived in the domestic market as compared to foreign-market characteristics perceived as barriers. Thus, this finding suggests the importance for policymakers of working on the provision of information on international markets and consequently enlightening the perceptions of decision makers, following the arguments of Gunawan et al. (2004) that greater knowledge can support the firm's strategic choice to export. This finding is noteworthy because it sheds light on some overlooked aspects of previous research on the importance of governmental institutions in creating supporting conditions to meet the needs of firms aiming to develop international operations on either the importing or exporting side, or both, as Zahra (2005) has pointed out.

Organisational Dimension-related Factors

In this section the author explores the association with internationalisation of factors related to organisational characteristics, which have attracted the attention of researchers (Fletcher, 2001) in the international business field, and which were incorporated in this study's

proposed framework. The organisational dimension comprises five explanatory variables: the size of a firm, networking competences, technological capabilities, international entrepreneurial orientation, and international experiential knowledge. Hence the discussion of this section will focus on the results of *Hypotheses 9 to 13*, examining the effect of factors related to the *Organisational Dimension*, as presented in the theoretical framework.

Understood as a proxy for firm resources and capabilities, the size of a firm has been extensively investigated in its relationship with export performance, as pointed out by Ali (2004). For example, in an investigation of Austrian companies Baldauf et al. (2000) have found a positive relationship between greater size and higher export performance. In contrast, some authors have actually found no empirical evidence for the association between firm size and export performance (Ali, 2004) and others have even added weight to the ongoing debate whether firm size is or not a critical variable in a firm's internationalisation activities by arguing that the typical smaller size of younger firms may confer the sort of flexibility and entrepreneurialism required in global markets (Knight and Cavusgil, 2004).

In the context of these still conflicting views our result, as proposed in *Hypothesis 9*, indicates there are indeed strong constraints related to their size for Brazilian software firms aspiring to develop operations in international marketplaces. The logistic regression results suggest the significant and positive effect of the size of a firm on its internationalisation through both exports and imports. Thus *Hypothesis 9* was fully supported.

This finding therefore provides support to the contention of past studies on the effects of a firm's size on its international growth strategies (Buckley, 1993; Calof, 1994; Baldauf et al., 2000; Dimitratos et al., 2004; Tsai and Cheng, 2004).

Using the scale first developed and measured empirically by Ritter (1999), the results of this study do not provide support for *Hypothesis 10*'s suggestion that a firm's networking competences impact the internationalisation of a firm. This study represents an attempt to extend the studies by Ritter (1999), who tested and found significant association between network competence and performance measures in German companies, and Ritter et al. (2002), whose findings in a UK sample also showed a significant impact of network competence on the degree of a firm's technological interweavement and innovation success.

Nevertheless, the non-significant results achieved in this study are perhaps due to the fact that, in contrast with prior studies, this research investigates for the first time the impact of networking competences in a distinct research setting and on a different dependent variable: the internationalisation of a firm. The logistic regression and MDS results of the present research may provide the basis for further refinements of the current set of variables in the scale.

The technological capabilities of a firm, measured by R&D expenditures for the period 2003-2005 and patents held, appear to play a significant role in the inward aspect of internationalisation of a firm. On the other hand, the link between technological capabilities and exports of firms is unclear in this study. Thus *Hypothesis 11* is supported for imports only. The

results of logistic regressions on the two sample sub-groups, smaller and larger firms, can provide a better explanation of the specific effects that technological capabilities have on the internationalisation of software firms. This will be discussed in more detail later in the chapter.

The empirical results in the overall sample examination confirm that the international entrepreneurial orientation of a firm influences in a highly significant way its exports, the outward element of internationalisation examined in this study. This finding is in line with Jones and Coviello (2005) who put forward the view of internationalisation as a process of entrepreneurial behaviour. This finding is also supported by our MDS results in both the exporters and importers sub-groups, in which participating entrepreneurs reveal the importance of proactive opportunity-seeking behaviour. However, the regression results showed no evidence of the effect of the international entrepreneurial orientation of a firm on imports. This is somewhat surprising in the light of past studies which suggest that the entrepreneurial behaviour exhibited by a firm, regarded as a set of management strategies and practices in the pursuit of opportunities, have positive effects on business outcomes (Stevenson and Jarillo, 1990; Brown et al., 2001; Knight, 2001; Luo et al., 2005; Lin et al. 2006). Thus *Hypothesis 12* is supported for exports only.

The findings regarding the impact of the lack of international experiential knowledge, perceived as an obstacle to attempts by the company to do business abroad, on the outward element of the internationalisation of a firm, exports, as stated in *Hypothesis 13*, are in line with Eriksson et al. (1997). However, no significant association was found

between the lack of international experiential knowledge perceived as a limitation and imports. As such, the analysis confirmed *Hypothesis 13* for exports only.

This result differentiates this study since, to the best of our knowledge, such a variable has not been taken into account in previous studies of software firms' internationalisation. This finding, if taken together with the results of hypothesis 3, emphasises that management's perceptions of external and internal constraints for international operations are useful factors for understanding the internationalisation behaviour of firms.

Entrepreneur Dimension-related Factors

Given the predominance of smaller firms in this data set, and the role played by an entrepreneur in the strategy-making processes of a small business firm (Lloyd-Reason and Mughan, 2002), it would seem appropriate to speculate that entrepreneur-related factors, such as management style, might have mediating and interaction effects and influence the international entrepreneurial orientation and its impact on the international performance of software firms.

In contrast with the great attention given in previous internationalisation researches to the demographic characteristics and role of the entrepreneur in influencing a small firm's international behaviour (Madsen and Servais, 1997; Andersson, 2000; Lloyd-Reason and Mughan, 2002; Jones and Coviello, 2005), little evidence of such relationship was found in this study. With one exception, no significant associations could be found between most of the personal-level characteristics of entrepreneurs

(age, education and language skills) and the internationalisation of software firms in our study. The only exception was the experience of the entrepreneur, measured by the number of years of work in the software industry, which was found to have a negative and highly significant effect on imports. Thus support was given for *Hypothesis 14c*.

The somewhat surprising finding that the more years of experience the decision-maker has in the software industry the less likely it is that his/her firm imports could be in fact explained by influences of the national context. This could imply that the more experienced entrepreneurs of software firms might have started their own business operations or even their professional activities in a period of time when protectionist policies were still in place in the country and the local market was protected against any form of commercial foreign exchanges. It is believed that entrepreneurs from domestically-owned software firms who started operations before the liberalisation policies of the industry adopted from 1992 onwards, as research on liberalisation of the computer software industry in Brazil and Mexico in the 1990s done by Dedrick et al. (2001) indicates, may face an inertial constraint and thus might reveal a relatively weaker impetus to move into international trading activities such as exports or imports. Speculating about the perceptions of such entrepreneurs, moving into international operations could be seen as a risky and costly growth strategy after many years of experience within the industry, having secured a competitive position in the local market.

Another explanation for this finding could be that, given the relatively homogeneous demographic characteristics of entrepreneurs in our sample,

especially in terms of educational levels and technical expertise, other behavioural elements linked to the entrepreneur may have more profound effects on the internationalisation of software firms. For example, this study shows the significance of factors such as external constraints and international experiential knowledge, perceived as barriers to internationalise operations by entrepreneurs. These findings may indicate the need to look more closely at the influence of other behavioural characteristics of the owner-manager, reflected at the organisational level, when investigating the international behaviour of software firms.

8.2.5 Differences between Smaller and Larger Software Firms

The results of the split-sample logistic regression analyses of this study highlight several important differences between smaller and larger Brazilian software firms.

In the case of significant factors explaining the exports of smaller firms, a key finding is that business network-collaboration is the most important explanatory factor in the existence of exports by smaller Brazilian software firms in this investigation. From this finding, it is reasonable to infer that a smaller firm which operates in isolation tends to be less internationalised than those which collaborate with other enterprises. This result is consistent with data from the ENS survey of the Observatory of European SMEs (2003) showing the development of external relationships in the form of collaborative approaches and networks as a key instrument among internationalising SMEs. As noted by Franco (2003) in an empirical study on collaboration among industrial Portuguese SMEs, international

collaboration can be the easiest way for internationally inexperienced SMEs to enter new foreign markets. However, differently from the vast majority of previous research, our study provides empirical evidence of the impact of business network-collaboration on the internationalisation of smaller firms in a high-tech industry such as software from an emerging country's perspective.

As emphasised by Yiu et al. (2007) there is extensive empirical support for the view that firms with higher levels of technological capability are more likely to internationalise. This holds true especially for smaller firms in our study, as there is a significant impact of technological capabilities on exports by smaller software firms. This finding supports previous studies that acknowledge the role of technological capabilities as a predictor of the degree of internationalisation of a firm in developed countries (Lefebvre et al., 1999; Luo, 2000; Liu et al., 2000; Flor and Oltra, 2005), and also in developing countries (Yang et al., 2004; Estrada and Heijs, 2006).

Perhaps given the intrinsically technological nature of the software sector and the rapid changes in the globalised business environment, it is reasonable to speculate that the unexpected finding of a negative impact of collaboration with foreign partners on imports by smaller software firms could be explained by the opportunities for pre-competitive R&D collaboration, access to technical knowledge and technology transfers conferred by collaborative arrangements between foreign partners - including businesses, academia, R&D institutions and foreign governments - and domestic smaller software firms. This may reduce the need for direct imports by smaller firms in the software industry.

If, on the one hand, collaboration with foreign partners has a negative effect on imports by smaller firms in our sample, on the other, their technological capabilities seem to have a positive and significant impact on imports. The positive effect of technological capabilities on imports may be related in turn to the acquisition of technological inputs and services through foreign suppliers which would enable software firms, in the long run, to enter and compete in technologically more advanced foreign markets.

The above findings may suggest that a gradual build-up of capabilities over a period of time should be considered in order for these technological capabilities to produce effects on the presence of smaller software firms in foreign markets. Collaborative arrangements are becoming increasingly international in the software industry and represent opportunities to gain access to new markets with jointly developed technologies, one of the major foci of policy incentive schemes in several countries, facilitating the establishment of business ties, as some recent studies recognise (OECD, 2009).

Of course, the interpretations offered above need to be confirmed through further research. The assumptions aforementioned call for a longitudinal approach to see how these technological factors affect the internationalisation performance of smaller firms over a period of time. Also, inclusion of firms from emerging-country economies in other less technologically-oriented sectors would provide a more unbiased test of the impact of technological capabilities on their international performance.

Contrary to earlier studies that suggest the association between the international entrepreneurial orientation of a firm and the internationalisation

of smaller firms (Brown et al., 2001; Knight, 2001), no evidence of such association was found in this research. One plausible explanation for the unexpected finding may be what Lumpkin and Dess (1996) contend, that the industry and business environment of a firm, on the one hand, and the organisational structure and the characteristics of its founders, on the other, may vary considerably, so that a contingency approach for investigating the associations between international entrepreneurial orientation and performance of a firm is needed. Moreover, some studies more recently have also emphasised that domestic environments may impact considerably the entrepreneurial orientation of exporters, restricting the generalizability of results to exporters operating under different national conditions (Balabanis and Katsikea, 2003; Lin et al., 2006). Thus, the above discussed reasoning may explain why international entrepreneurial orientation was not helpful as an explanatory variable for the internationalisation of smaller firms in this study.

Finally, the findings of the regression analyses indicate that in relation to the associations between the characteristics of decision-makers in smaller firms, in comparison with the results of the overall sample, a similar pattern emerges for imports, showing a significant negative association between imports and years of experience of the respondent in the software industry.

With regards to the determinants of internationalisation by larger firms, three factors emerge in the regression analyses as significantly explaining exports in this research. First, international entrepreneurial orientation appears to be the single most significant factor in the explanation of exports by larger software firms. This finding suggests that international

entrepreneurial orientation – a concept derived from the corporate-entrepreneurship literature – may be a larger-firm phenomenon. The empirical findings of Balabanis and Katsikea (2003) and Dimitratos et al. (2004) actually suggest a strong positive association between size and entrepreneurial behaviour that may lead to superior performance in international markets. Also, Messeghem (2003) has found no direct link between a firm's smaller size and its entrepreneurial behaviour. Indeed, Messeghem's investigation revealed that entrepreneurial firms are more characterised by their organisational structure, defined by standardisation, formalisation, specialisation, the planning and control system, and the information system, than by their smaller size.

Second, the institutional connectedness of larger firms shows a positive significant effect on their exports. This could be due to the generally accepted argument of the less resource constraints that larger firms have – including managerial and informational – in comparison with smaller firms. Following this logic but advancing it with a sociological account of economic actions, as proposed by Granovetter (1973; 1985; 1992; 2005), this finding could also be interpreted as suggesting that larger firms possess “social embeddedness advantages” reflected by their ability to capitalise on connections and co-ordination mechanisms established with other institutional actors, such as technical, research and regulating institutions to access foreign business knowledge which in turn facilitates international operations. It is noteworthy, as Botelho et al. (2005) argued, that the Brazilian software industry still lacks a unified voice, a truly representative industry association, in absolute contrast, for example, to NASSCOM, a

trade body which provides advocacy on public policy, international trade development, research and market intelligence services to software companies in India. Hence the importance of such strategic institutional linkages with government and other institutions for software firms in the Brazilian context. Finally, the impact of the institutional connectedness of larger software firms on exports leads to the argument of the importance of linkages between larger and smaller software firms for the internationalisation of the latter.

The third key explanatory factor of exports by larger firms is related to the years of experience of the respondent in the software industry. Similarly to the findings of imports in the smaller firms' sample, a significant and negative association between exports and the years of the experience of the entrepreneur was found. It should be noted, however, that the magnitude of the negative effect is higher in the case of larger firms.

With regard to the determinants of imports by larger firms, three factors emerge as significantly affecting the inward element of internationalisation. First, the existence of governance mechanisms in the business networks they belong to emerges as the single most important network-related determinant of imports by larger firms. It is noteworthy that the existence of governance mechanisms is the only determinant, among the network-related explanatory factors, to have an influence on larger firms' internationalisation. An explanation for this finding could be that, due to the larger size of firms and the possible criticality of the foreign resources they acquire, the existence of governance mechanisms plays a more crucial role in facilitating the exchange of needed resources among business network

partners. This line of reasoning is in accordance with some proponents of the resource-based view of the firm and the resource dependency theory (McEvily and Zaheer, 1999), which combined with the network approach, contribute to the explanation of governance mechanisms in business networks, as the literature review in Chapter 3 emphasises. This finding sheds some light on some of the specific requirements that business networks should have to produce benefits to larger firms engaging in international activities.

Second, international experiential knowledge, perceived as a limitation, has a negative effect on imports by larger firms. This is consistent with the notion advanced by Eriksson et al. (1997) that experiential knowledge is a higher resource-commitment process, thus impacting on larger firms.

Third, the experience of the entrepreneur, measured by years of work in the industry, has a negative impact on imports. Although this finding follows a similar pattern compared to both the overall sample and the smaller firms' sub-group sample findings, it reveals an even greater effect in the case of imports by larger firms.

To conclude, our empirical findings suggest that different explanatory factors impact the internationalisation of smaller and larger software firms in Brazil, and that these impacts vary in strength. Table 8.1 displays a summary of the results of the regression analyses on the two sample sub-groups.

Table 8.1: Summary of Empirical Results: Sample Sub-Groups

Dimensions of Analysis	Explanatory Factors	Statistical Confirmation			
		Exports		Imports	
		Smaller Firms	Larger Firms	Smaller Firms	Larger Firms
Contextual Dimension	Institutional connectedness	No	Yes *	No	No
	Geographical concentration of firms	No	No	No	No
Network Dimension	Participation in business networks	Yes *	No	No	No
	Collaboration with foreign partners	No	No	(-) Yes **	No
	Governance mechanisms	No	No	No	Yes *
Organisational Dimension	Networking competences	No	No	No	No
	Technological capabilities	Yes *	No	Yes **	No
	International entrepreneurial orientation	No	Yes **	No	No
	International experiential knowledge as a limitation	No	No	No	Yes **
Entrepreneur	Age, education, experience, and language skills of the entrepreneur	No	Partially (-) experience *	Partially (-) experience **	Partially (-) experience *

Notes: Yes = Significant support found; No = No significant association found; Partially = supported to some extent. *** p<0.01, ** p<0.05, *p<0.10

8.2.6 An Overview of Research Findings

In concluding the discussion of research findings, the results of the study suggest that significant factors and mechanisms at the contextual, network, organisational and entrepreneur-related dimensions can explain the internationalisation of Brazilian software firms. However, the most important sets of explanatory factors in the overall sample are network dimension- and organisational dimension-related factors. In this respect, the findings are similar in the case of smaller and larger firms. The findings discussed in the previous sections draw our attention to several points.

First, the regression results of this research indicate that the explanatory factors which exercise the greatest influence on both exports and imports are organisational-related, providing evidence of the importance of firm-specific strategies in the internationalisation behaviour of software firms. This might be due to potential heterogeneities among Brazilian software firms and may shed some light on how to explain variations in internationalisation patterns among firms. However, this cannot lead us to conclude that other factors at the contextual and network dimension have no effect on the way firms actively engage in international activities.

For example, at the network dimension, the participation in collaborative arrangements through business networks is found to impact positively the exports of software firms. Thus, we should also take into account the mediating effect that, for example, access to support agencies at local level and the participation in business networks might have on more and improved access to international market knowledge and subsequent

foreign market penetration. These institutional and network connections may constitute therefore the medium through which critical resources, such as up-to-date knowledge on international market opportunities, are pulled into the firm, as previous research has emphasised (Welch et al., 1996; Coviello and Munro, 1997; Welch et al., 1998; Chetty and Wilson, 2003; Elango and Pattnaik, 2007).

Second, there is a noteworthy emergence of a clear “internationalisation preparation” region in the perceptual map of the international entrepreneurial orientation construct examined in the MDS analysis, which, in conjunction with the positive effect of this factor on exports found in the regression analysis, suggest the critical role played by information-searching before entering foreign markets in the internationalisation of software firms, the product of which may be regarded as objective market knowledge. It should be noticed that the importance of foreign market knowledge has been recognised by studies following either the incremental or the born-global view of internationalisation, as emphasised by Zhou (2007).

This result, however, contradicts the assumptions of the incremental view that objective market knowledge, acquired through more standardised methods, such as market intelligence, for example, is of minor importance, in contrast to experiential knowledge, related to knowledge of foreign business and institutions, and other legal and commercial matters, in a firm’s internationalisation process, as is postulated in Eriksson et al.’s (1997) empirical work. Garvey and Brennan’s (2006) study of the internationalisation of Irish software firms also stresses the role of experiential knowledge in

influencing the pattern, pace and level of internationalisation in the software sector.

In this sense, market knowledge could be regarded as an entrepreneurial mechanism which drives the efforts of firms to develop international market operations, rather than an obstacle which has to be overcome, as viewed by Eriksson et al. (1997). As a significant negative association was found between the perceived lack of experiential knowledge and exports, but a stronger association between the latter and international entrepreneurial orientation, in which internationalisation preparation emerges as a key element, our contention is that anticipated acquisition of objective knowledge on international markets and experiential knowledge are both important factors, but may affect the firm differently during its internationalisation process.

Third, the significant association between the size of a firm and its internationalisation has been consistently supported in all findings made during this research's statistical testing. As noted earlier, this result confirms a long-standing stream of research on the resource-constraining effect of size on a firm's exporting behaviour (Culpan, 1989; Bonaccorsi, 1992; Buckley, 1993; Calof, 1994; Wakelin, 1998; Gourlay et al., 2005). Nevertheless, following the suggestion of Calof (1994), instead of confining the investigation only to propensity to export, as previous studies usually have done, this study has addressed an important issue not well researched before: the relationship between firm size and internationalisation, measured by two performance measures: exports and imports.

Fourth, it is important to emphasise at this stage that inward-outward links were supported in this research, showing, for example, that export-relevant possibilities might have come through a foreign supplier. We therefore found strong support for the argument that building relations with foreign actors and providing opportunities to gain knowledge about foreign operations through imports may create a platform for firms to develop subsequent outward activities (Bell, 1995; Korhonen et al., 1996; Roolaht, 2002; Karlsen et al., 2003).

Fifth, notwithstanding the aforementioned aspects, it should be observed that relatively weaker statistical models emerged for imports through the logistic regression examinations. It is reasonable to assume that factors that predict outward forms of internationalisation may not fully predict inward forms of this phenomenon, contrary to what a previous study by Fletcher (2001) has found. Such findings could be justified perhaps by theoretical or methodological reasons. Some scholars recognise the neglect in past research of a more holistic view of internationalisation, encompassing both inward and outward patterns of international operations (Fletcher, 1996; Korhonen et al., 1996; Fletcher, 2001; Karlsen et al., 2003). This neglect may have led to the consequent lack of theoretically-derived and empirically-tested variables which could specifically predict inward forms of internationalisation. Taking into consideration possible methodological shortcomings of the present study in regard to this finding, the survey approach should be supplemented by more in-depth and in-process research to uncover the subtleties and linkages of inward-outward patterns of internationalisation, as Korhonen et al. (1996) suggest.

Finally, looking at the control variables, having embedded software as an area of activity, an industry factor, provides a reasonable estimate for each firm's likelihood of being an exporter, while the age of a firm also shows a positive effect on imports. The finding of the impact of firm age is in line with arguments that older firms that have been embedded in the pre-liberalised period are more risk-adverse, as previous studies on the international expansion of firms from other emerging economies have emphasised (Yiu et al., 2007). This could be the explanation for this finding, as some older firms in our sample may have been established before the liberalisation policies for the software industry in Brazil during the 1990s.

It is possible to speculate that embedded software, as an area of activity of a software firm, seems to relate to specific vertical segments where market niches are targeted to be served, and in which Brazil has become competitive worldwide. The development of local supply linkages between foreign subsidiaries operating in Brazil and domestic software firms, integrating the latter into global value chains in the telecommunications sector, is also a plausible explanation for the entry routes of Brazilian software producers of telecom applications into foreign markets.

The empirical strength of this finding is reinforced by the conclusions of studies done by the Massachusetts Institute of Technology – MIT (2002) and Botelho et al. (2005) on the development paths of the software industry in Brazil, China, Mexico, and the 3 Is (India, Ireland and Israel). In the Brazilian section of the MIT study, it is emphasised that international competition in higher added-value software services in vertical areas where current Brazilian customers are of world class (telecommunications, e-gov,

data and network security, financial or retail services) should be explored better in international markets. Also, a more recent study done by the Society for the Promotion of Excellence in Brazilian Software – Softex (2005) – indicates that Brazilian subsidiaries of multinational enterprises (MNEs) in the telecommunications sector are increasingly integrated into global value chains through which the development and exports of software on demand to headquarters are carried out.

Finally, apart from fulfilling the study's three main objectives, our empirical findings shed some light on what factors can explain the differences in internationalisation between smaller and larger software firms. Given the importance of size of a firm as a key explanatory determinant of both exports and imports by software firms in our study, the quantitative findings of the factors differentiating the internationalisation of smaller and larger software firms offer a unique contribution to both academic and industry experts, as no other research of this type has been done in Brazil. A summary of the empirical findings with the statistical test of the research hypotheses in the overall sample is provided in Table 8.2.

Table 8.2: Summary of Empirical Results: Findings vs. Hypotheses (Overall Sample)

Dimensions of Analysis	Hypotheses	Statistical Confirmation		Comparison with Previous Research	
		Exports	Imports	For	Against
Contextual Dimension	H1: The institutional connectedness of a firm is positively associated with the likelihood of its internationalisation.	Yes **	No	Yiu et al. (2007)	-
	H2: The geographical concentration of firms is positively associated with the likelihood of the internationalisation of a firm.	No	No	Boschma and Ter Wal (2005),	Pietrobelli and Rabellotti (2006)
	H3: The perceived external constraints for international operations by a firm are negatively associated with the likelihood of its internationalisation.	Yes **	No	Pett et al. (2004)	-
Network Dimension	H4: The participation of a firm in business networks is positively associated with the likelihood of its internationalisation.	Yes **	No	Coviello and Munro (1997); Chetty and Wilson (2003); Glücker 2006	Bjorkman and Kock (1997)
	H5: The collaboration of a firm with foreign partners is positively associated with the likelihood of its internationalisation.	(-) Yes *	No	Elango and Pattnaik (2007)	-
	H6a, H6b, and H6c: Trust, commitment, and capabilities of partners in the business networks it belongs to are positively associated with the likelihood of the internationalisation of a firm.	No	Yes ** (capabilities of partners)	Sherer (2003); Spekman et al. (2006)	-
	H7: Interdependence between partners in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.	Yes *	No	Smith and Barclay (1999)	-
	H8: The existence of governance mechanisms in the business networks it belongs to is positively associated with the likelihood of the internationalisation of a firm.	No	No	Hoang and Antoncic (2003); Guibert (2006)	-
Organisational Dimension	H9: The size of a firm is positively associated with the likelihood of its internationalisation.	Yes ***	Yes **	Tsai and Cheng (2004)	Ali (2004), Knight and Cavusgil (2004)
	H10: The networking competences of a firm are positively associated with the likelihood of its internationalisation.	No	No	Ritter et al. (2002)	-
	H11: The technological capabilities of a firm are positively associated with the likelihood of its internationalisation.	No	Yes *	-	Flor and Oltra (2005); Estrada and Heijs (2006)
	H12: The international entrepreneurial orientation of a firm is positively associated with the likelihood of its internationalisation.	Yes ***	No	Lumpkin and Dess (1996)	Stevenson and Jarillo, (1990), Brown et al. (2001)
	H13: The lack of international experiential knowledge of a firm is negatively associated with the likelihood of its internationalisation.	Yes *	No	Eriksson et al. (1997)	-
Entrepreneur	H14a, H14b, H14c, and H14d: The age, education, experience, and language skills of the entrepreneur of a firm are positively associated with the likelihood of its internationalisation.	No	(-) Yes *** (experience)	Zuchella et al. (2007)	Lloyd-Reason and Mughan (2002)

Notes: Yes = Significant support found; No = No significant association found; Partially = supported to some extent. (-) = Negative association. *** p<0.01, ** p<0.05, *p<0.10.

8.3 Research Contributions

Taking a behavioural perspective, this study started with the assumption that business networks are increasingly instrumental for firms operating in internationalised high-tech markets. This assumption led to the four specific research questions which this thesis sought to elucidate. The findings in this study, given its focus on firms' internationalisation from an emerging-economy perspective, contribute to expanding current knowledge in several ways.

Although a few recent studies have explored some aspects of the internationalisation phenomenon of software firms in Brazil (Softex, 2005; Botelho et al., 2005; Roselino, 2006a; Dib et al., 2008), to the best of our knowledge this present study has unique characteristics.

While a detailed analysis of this study's results has been offered in Chapters 5 to 7, and a discussion of empirical results is presented in the previous sections, the main findings of the thesis are summarised and integrated in Table 8.3, in the context of the research questions posed in Chapter 1.

Table 8.3: Summary of Main Findings

Research Question	Main Findings	What is not yet known
RQ1. <i>What is the extent of internationalisation of Brazilian software firms?</i>	The findings show a dominant inward pattern of internationalisation among Brazilian software firms, with its outward component, exports, being limited in scale and scope. This can be seen as a gap when set alongside the degree of internationalisation of technology-based firms in both large developed economies such as The United States, and small developed ones, such as Ireland, or even in comparison with some emerging-market countries which are known for the internationally-advanced position of their domestic software firms, such as India. Although the Brazilian firms are internationalising their operations mainly through imports, a trend towards more outward-driven internationalisation strategies, such as exports, appears to be emerging among Brazilian software firms in the period 2003-2005. In fact, a pattern of rapid pace of outward internationalisation can be observed among internationalising firms.	<ul style="list-style-type: none"> • What are the distinctive factors that may explain the inward internationalisation behaviour of software firms? • What role industry-specific factors may play in the early internationalisation of high-tech firms in emerging economies? • What are the effects of the Production Development Policy (PDP) measures launched by the Federal Government in 2008 on the internationalisation of Brazilian software firms? • Is early internationalisation conferring substantial benefits on Brazilian software firms, and in what ways? Is there an impact on long-term performance?
RQ2. <i>To what extent is the internationalisation of Brazilian software firms driven by collaboration through business networks?</i>	It can be argued that collaborative relationships through business networks, although not a widespread phenomenon among Brazilian software firms, in fact play a very important role in their internationalisation processes, especially in export-driven activities. Further, network collaboration has a strong impact on exports by smaller Brazilian software firms. Business networks are thus strategic mechanisms through which a software firm develops its internationalisation trajectory, as hypothesised. This finding led the researcher to examine what specific network factors have an effect on firms' internationalisation.	<ul style="list-style-type: none"> • What is the role of ICT technologies and internet-based tools in the establishment of network-based internationalisation strategies of software firms from emerging economies? • What are the possibly negative effects of business-network collaboration on the internationalisation of software firms?

Table 8.3: Summary of Main Findings (continued)

Research Question	Main Findings	What is not yet known
RQ3. <i>What are the factors that explain the effect of business networks on Brazilian software firms' internationalisation?</i>	At the network dimension , in further evaluating the significant effects of network factors, it is observed that relationships with foreign partners have a negative effect on exports and imports of smaller firms. Also, capabilities of partners have a negative impact on imports. However, the interdependence between partners and governance mechanisms in business networks are elements found to be significantly associated with exports and thus should be considered in the implementation of network strategies by software firms.	<ul style="list-style-type: none"> • How governance mechanisms affect interdependence with network partners. • What role can governmental and business-support agencies play in facilitating network-based internationalisation strategies of software firms? • To what extent are network connections contributing to improved access to international market knowledge? • Why and how collaborative strategies with foreign partners differ from other forms of network collaboration in the internationalisation trajectories of software firms. • To what extent local supply linkages between foreign subsidiaries operating in Brazil and domestic software firms are contributing to the internationalisation of the latter.
RQ4. <i>Can factors related to the four dimensions examined in this study be used to explain differences in the internationalisation of software firms?</i>	Using a theoretically derived integrative framework, the discussion carried out provided empirical evidence on the combined influence of four interrelated sets of factors – contextual, network, organisational, and entrepreneurial – impacting the internationalisation of Brazilian software firms.	<ul style="list-style-type: none"> • Can the integrative framework tested in this research be applied in a different setting such as another sector or country?

Table 8.3: Summary of Main Findings (continued)

Research Question	Main Findings	What is not yet known
<i>RQ4. Can factors related to the four dimensions examined in this study be used to explain differences in the internationalisation of software firms?</i>	<p>In the case of contextual-related factors, the ease of access to established broader policy and technological networks, conceptualised in this study as the “institutional connectedness” of a firm, and the perception of external constraints for international operations, showed significant associations with a firm’s internationalisation. Contrary to the traditional industrial-districts view, however, and to the hypothesised expectation of this study, we found that the concentration of firms within a geographical area has no significant effect on a firm’s internationalisation. At the network dimension, in further evaluating the significant effects of network factors, it is observed that relationships with foreign partners have a negative effect on exports and imports of smaller firms. Also, capabilities of partners have a negative impact on imports. However, the interdependence between partners and governance mechanisms in business networks are elements found to be significantly associated with exports and thus should be considered in the implementation of network strategies by software firms. The discussion of organisational related factors showed that size of a firm, international entrepreneurial orientation, and perceived lack of international experiential knowledge by decision-makers are significantly associated with the outward internationalisation of Brazilian software firms, while technological capabilities are only significantly associated in the case of inward internationalisation through imports. The results showed a highly significant association between a planned strategy towards internationalisation and seeking foreign market information before international sales, as the finding of the effect of international entrepreneurial orientation on exports suggests, indicating that firms should be able to make better-informed decisions and articulate internationalisation strategies on the basis of objective knowledge gained through information sought in advance on foreign markets, which ultimately could impact their internationalisation. Among the entrepreneur-specific factors, findings linked to their influence on the internationalisation of respondent firms raised an interesting discussion about the significant negative effect of years of experience within the industry on both exports and imports by larger, and larger and smaller software firms, respectively.</p>	<ul style="list-style-type: none"> • Are industry-clusters facilitating the establishment of international linkages among software firms from emerging economies? • What information-sharing schemes are more effective for the internationalisation of software firms from emerging economies? • What role business associations play in overcoming the lack of resources and knowledge that smaller firms may encounter in trying to enter new international markets effectively. • What is the impact of the domestic environment on the entrepreneurial orientation of software exporters? • Can entrepreneur-related factors have mediating effects and influence on the international entrepreneurial orientation and the international performance of software firms? • How the entrepreneur’s perceptions of external constraints for international operations change over time. How changes in perceptions affect the pace, mode, and degree of internationalisation of software firms.

8.3.1 Empirical Contributions

In this thesis, two empirical contributions are worthy of discussion. Firstly, this study fills a much-needed gap by providing empirical evidence on Brazil, an emerging economy that despite its importance as having the tenth largest GDP in the world (World Bank, 2008) and its role in the global economy has not been thoroughly researched before in the literature. Therefore, this study extends the generalizability of previous research findings across countries.

Secondly, this study provided evidence from a national sample of Brazilian high-tech firms in a fast-moving global industry, the software and allied services industry, which has been acknowledged for its developmental impacts in specific countries such as India, Ireland, and Israel (Heeks and Nicholson, 2002).

8.3.2 Theoretical Contributions

Existing research on the internationalisation of firms has tended to focus only on the outward component of the internationalisation process, leaving aside other forms of international operations such as imports, as the review of internationalisation research in Chapter 3 pointed out. This thesis addressed this shortcoming by offering empirical evidence of interplay between the inward and outward elements of the internationalisation process of software firms in Brazil, with exports and imports displaying a significant association. Therefore, one of its contributions to the internationalisation literature consists in examining the internationalisation phenomenon in a

broader sense, filling the gap in extant research with a more holistic view of internationalisation as a two-sided process of both inward and outward international operations.

The review of the internationalisation literature provided in Chapter 3 also revealed that previous internationalisation research does not provide a theoretical perspective that incorporates elements from various theories. Further, although some integrative efforts had been made in recent studies, the review showed that a consistent and integrated framework for evaluating the internationalisation of firms was lacking.

This thesis tries to close these research gaps and has contributed to the internationalisation literature in two specific ways. First, having the network approach as its main theoretical underpinning, this study developed an interdisciplinary perspective by seeking insights from four distinct domains - economic sociology, industry clustering, international entrepreneurship, and strategic management – as well as using key concepts borrowed from export development studies and the Uppsala internationalisation model. Second, through the empirical testing of its integrative theoretical framework, which jointly considered internal and external factors associated with the contextual, organisational, network and entrepreneurial dimensions, rather complementary theories and concepts were combined in the study of the internationalisation of firms. Therefore, this thesis underscores the importance of taking an integrative approach to internationalisation in order to address the elements needed to improve the performance of firms, especially those of smaller size, in international markets.

This study contributes to emphasising the importance of networks in the internationalisation of high-tech firms by providing empirical evidence that goes beyond anecdotal cases in the literature. Unlike other limited studies about the internationalisation of firms in emerging market contexts, this study sought to uncover the various factors that determine the impact of business-network collaboration on the internationalisation strategies of Brazilian software firms. By doing so, this thesis enhances the generalizability of the findings across emerging-market countries and moves beyond the mainstream internationalisation literature by developing conceptual links between often-separated elements to explain the combined influence of several factors.

This study's contribution to the network school of internationalisation lies in the fact that in the context of each firm's network, the effect of business-network collaboration on internationalisation was investigated in terms of several key aspects. The empirical findings of the study support the contention that the positive effects of business networks on the outward internationalisation of firms are not homogeneous and can be enhanced by having interdependence between partners and governance mechanisms in business networks. Also, the rationale provided through the combination of the network approach with economic sociology is an important resource for scholars interested in studying the role of business networks in firms' internationalisation strategies.

The findings of this research suggest that studies based on the business-network model of internationalisation can no longer ignore the impact of other factors at the contextual, organisational, and entrepreneurial

level. Incorporating these elements into research that seeks to explain the impact of network relationships on the internationalisation of firms could provide a more sophisticated understanding through new insights, and allow scholars to go beyond one-dimensional and static theorising.

8.3.3 Methodological Contributions

There is a call in network research for methodological integration within the field, combining qualitative/descriptive and more predictive methods (Hoang and Antoncic, 2003). Thus this study's main methodological contribution, building upon predominantly qualitative case-based findings of the effects of network relationships on internationalisation of high-tech firms from several, mostly developed, countries of the world, was to test the generalizability and statistical robustness of these results in an emerging market context. The research therefore expands on the anecdotal evidence given by studies on the impact of network strategies on the internationalisation of firms.

Moreover, by applying the multidimensional scaling (MDS) technique in this study, an approach rarely adopted in international business research, it was possible to uncover qualitative aspects for the discrimination of distinct patterns of perceptions by respondent entrepreneurs in regard to seven key explanatory determinants of exports and imports, providing a comprehensive explanation of unrecognised dimensions affecting the internationalisation behaviour of firms.

Among the nineteen constructs of this study that emerged from the literature, as indicated in Chapter 4, new operationalisation of five constructs

was undertaken: institutional connectedness; external constraints for international operations; interdependence with partners; governance mechanisms; and technological capabilities – contributing to generate new measures of relevant factors in internationalisation research. Despite their high reliability values and usefulness for this study, these constructs should be further tested to improve future research.

This study therefore extends empirical research as it is one of very few studies to examine quantitatively in an emerging-economy country the impact of collaborative relationships through business networks on the internationalisation of software firms, and it is the first to measure impact across a broad range of factors. Furthermore, the unique integrative framework developed in this study obtained substantial empirical support and thus has addressed the paucity of studies taking the perspectives of firms from emerging-economy contexts. Hence, it constitutes a well-grounded framework that can be tested in other research looking to explain the internationalisation of firms.

8.4 Implications for Policy and Business Practice

The main findings of this study, displayed in Table 8.3, have direct implications for policy and business practice. Thus, the empirically-tested theoretical framework developed in this study, which revealed simultaneous linkages among relevant internal and external factors that are likely to influence the internationalisation of firms is particularly useful for policy and business practice. Such a combined framework, developed and tested in this

research, may assist the systematic identification and evaluation of the broad range of factors that influence firms' internationalisation.

Specifically from a managerial perspective, the integrative framework of this study can be used as a comprehensive tool to increase entrepreneurs' competences to implement and review appropriate internationalisation strategies.

The study findings showed that although rare among the surveyed software firms, planned strategies towards internationalisation are valuable because entrepreneurs should be able to make better-informed decisions and articulate internationalisation strategies on the basis of international market knowledge gained through information sought in advance. This ultimately could impact the internationalisation of software firms.

Additionally, this study highlights the point that the competence of a smaller firm to strategically collaborate through networks, as an individual actor, with both firms and institutional partners, is a factor that can introduce specific benefits to its internationalisation processes. Therefore, based on this study's findings, an important implication is that managers should be aware of the importance of the possession of managerial orientations and strategic approaches as determinants of performance in the international activities of firms.

From a public policy perspective, the results obtained during the course of this research point to the importance of the facilitation role of institutions for the internationalisation of firms in emerging-market countries such as Brazil. Overcoming the barriers to bridging linkages between distinct business actors may be enhanced by public policy intervention initiatives.

Moreover, for the internationalisation of smaller firms, which may have limited access to resources and information, an articulated institutional infrastructure available through local agencies can play a critical role in assembling resources through the diffusion of technical and market information, and in the provision of financial and other professional services.

Further, using the findings of this study, it is important to stress for policymakers and business-development services agencies interested in promoting the international competitiveness of smaller software firms that the stimulus for business networks should not be viewed in isolation from the need to strengthen networks of established policy and technological institutions; rather, despite their distinct purposes, appropriate measures and programs should be designed aimed at connecting one to another.

Moreover, policymakers should be aware that leveraging the competences of firms from sectors with a high level of technological complexity and technical skills such as the software industry to jointly perform activities for strategic purposes may be beneficial in overcoming the natural constraints that smaller firms face. Nevertheless, our findings suggest that not only policymakers should help smaller firms to develop more collaborative relationships through networks. Perhaps more importantly, smaller firms should also develop activities in a more articulated and network-based way amongst themselves.

Industry-specific factors may play a more critical role than prior research on internationalisation of firms has suggested. Placing this finding into context, there is a need for policymakers in emerging economies to address tailored support measures for assisting the internationalisation of

entrepreneurial software firms in the earlier stages of establishment. Also, the measures for newly established software firms might fill a gap which is addressed by Botelho et al. (2005), who warned that supportive policy instruments for the software industry in Brazil are still restricted to a few financial incentives.

Reviewing the findings of this study, the need for new approaches to firm internationalisation becomes quite clear. If policymakers and managers are committed to trying to realize the full benefits, usually strategic in essence, to be derived from networking between firms, they should plan carefully network-based internationalisation strategies looking at the impact that specific factors might have on the network success. Also, management's perception of the international environment as an external constraint for international operations is of critical importance, among other environmental conditions, being likely to represent a threat to the development of the firm's international operations.

Openness to trade and international linkages within a supportive relational environment that contributes to the development of an internationally competitive software industry in Brazil should be fostered in Brazil's future policies. Specifically, the foci of incentive measures such as tax benefits and credit mechanisms that are conceived in the Production Development Policy (PDP), recently launched by the Brazilian Government, should explicitly facilitate collaborative linkages between innovative, domestic software firms and foreign partners both in domestic and international markets.

Through interrelated measures, not only measures that stimulate exports of Brazilian software firms should be fostered, but also other modes of internationalisation. As the discussion in this chapter pointed out, the development of local supply linkages between foreign subsidiaries operating in Brazil and domestic software firms, integrating the latter into global value chains such as in the telecommunications sector, should also be used as a platform for the entry routes of Brazilian software producers into foreign markets.

Further, policies aimed at enhancing the internationalisation of Brazilian software firms should be innovative, flexible and viewed in a holistic manner rather than as a set of isolated measures. The successful experiences of software firms in other countries, such as in India, Ireland, and Israel, demonstrate that their business growth has been driven not only by market forces but also by the design and implementation of public policies that comprise measures to support domestic companies and business networks as well as to attract knowledge-intensive inward investments (Green et al., 2001).

However, policymakers need to be aware of the complexities of intervening with internationalisation measures. They should attempt to build longer-term relationships with internationalising firms in order to help them throughout the different stages of the process. It is believed that this study can be very useful for the future design and implementation of state and private programs whose objective is support for the internationalisation of technology-based smaller firms.

8.5 Research Limitations and Future Research Directions

While this research has made theoretical, empirical, and methodological contributions to the internationalisation stream of research, and has a variety of policy and business-practice implications, it has a number of limitations. One of the limitations is that although network relationships are dyadic in nature, the investigation was confined to the perspective of a single respondent, the owner/manager of the surveyed firm, which usually is recognised as restricting the generalizability of the findings because of common method bias as argued Brunetto and Farr-Wharton (2007). However, the literature on international entrepreneurship acknowledges the shaping role of the owner/manager in that his/her attitudes and behaviours are critical for determining the internationalisation strategies and market choices of smaller enterprises, validating the key-informant approach adopted for this study. Future work that may focus on quantitative data from firms' business networks, as the unit of analysis, should allow for the perceptions of several actors from distinct firms to be taken into account simultaneously and for network-level factors to be better differentiated from organisational-level factors.

Due to financial and time constraints, another limitation of this research is its cross-sectional nature, as opposed to a longitudinal design, limiting its ability to make stronger claims for the impact of participation in business networks on the internationalisation of firms, understood as a process, over longer periods of time. Further research should consider the influence of several network-level factors over time in the internationalisation processes of firms, such as the size of network, types of partners,

interdependences with foreign partners, and governance mechanisms, amongst others, to overcome this limitation of the present study.

Further to the limitation of its cross-sectional characteristic, the sample chosen comes from a single industry, the software and allied services sector, limiting the ability to generalize the results obtained beyond the scope of this study. Thus these findings would also be enriched in further investigations by comparisons between firms in selected emerging economies belonging to a range of different technology-intensive sectors. Finally, although the sample size of 148 respondent firms used in this study was enough for the statistical analyses carried out, a larger sample could facilitate the validation of the findings.

The interdisciplinary and comprehensive nature of this study also indicates several directions for future research. The broad range of variables included in this study's integrative theoretical framework is seen as a future line of research. Also, the findings from the logistic regression models for imports tested in this research suggest that the relationships of the organisational, network, contextual and entrepreneur-related variables with imports are probably more complex than was anticipated, not capable of being modelled completely using only the explanatory variables for exports. Given the interplay between the inward and outward elements of the internationalisation processes of software firms found in this study, a fruitful area of research could be the investigation of what are the distinctive factors that may explain the inward internationalisation behaviour of firms.

Knowing that geographical proximity or density of firms does not necessarily characterise an industry cluster, but rather that a typical cluster

displays features such as external economies, knowledge transfer, generalised reciprocity and flexible specialisation as well as strong and persistent linkages between a multiplicity of private actors, institutions, and bodies, and the government (Dayasindhu, 2002), an area for future research would be to investigate to what extent the location of software firms in industry clusters can impact the relationships that firms may develop and how this may influence the internationalisation of such firms.

At the time this thesis was concluded, the effects of the global financial crisis and economic slowdown on both developed and developing countries had already started to appear. The upsurge of heavier protectionist measures and other international trade-related barriers, and the slower growth of technology spending (The Economist Intelligence Unit, 2008) indicate that, as Arora and Gambardella (2004) noted, the expansion of the global software industry in the 1990s is unlikely to repeat itself in the near future. Notwithstanding that the likely effects of the crisis on the software industry are not yet known, the findings of this study indicate that, as the global software industry matures, software firms from emerging economies are challenged to adopt more and more effective strategies in order to access and maintain competitive positions in the international marketplace. In this context, careful attention should be given to coordination between the policy-making actors involved in the implementation of the Production Development Policy (PDP) measures by the Brazilian Federal Government, and to the effects of this new policy on the competitive conditions of Brazilian software firms in both domestic and international markets.

Finally, the investigation carried out in this thesis has offered new insights into the simultaneous linkages among relevant internal and external determinants which are likely to influence the internationalisation of Brazilian software firms. In response to aspects not thoroughly researched before, the framework developed in this study may contribute to a more holistic understanding of the complex phenomenon of the internationalisation of firms from emerging markets, and consequently to further empirical investigations.

References

Abercrombie, N., Hill, S. and Turner, B.S. (2000) The Penguin Dictionary of Sociology, Penguin Books Ltd., England.

Agndal, H. and Chetty, S. (2007) The impact of relationships on changes in internationalisation strategies of SMEs, European Journal of Marketing, 41, (11/12), 1449-1474.

Agresti, A. (2002) Categorical Data Analysis, 2nd edition, Wiley.

Ahokangas, P. (1998) Internationalisation and resources. An analysis of processes in Nordic SMEs, doctoral dissertation, Universitas Wasaensis, Vaasa.

Alajoutsijärvi, K., Mannermaa, k. and Tikkanen, H. (2000) Customer relationships and the small software firm. A framework for understanding challenges faced in marketing, Information & Management, 37, 153-159.

Ali, Y. M. (2004) Impact of Firm and Management Related Factors on Firm Export Performance, Journal of Asia Pacific Marketing, 3, (2), 5-20.

Ali, A. and Swiercz, P. M. (1991) Firm Size and Export Behaviour: Lessons from the Midwest, Journal of Small Business Management, 29, (2), 71-78.

Altenburg, T. and Meyer-Stamer, J. (1999) How to promote clusters: policy experiences from Latin America, World Development, 27, (9), 1693-1713.

Amaratunga, D., Baldry, D., Sarshar, M. and Newton, R. (2002) Quantitative and qualitative research in the built environment: application of "mixed" research approach, Work Study, 51, (1), 17-31.

Anderson, E. and Gatignon, H. (1986) Modes of foreign entry: a transaction cost analysis and propositions, Journal of International Business Studies, 17, 1-26.

Anderson, O. and Buvik, A. (2002) Firm's internationalisation and alternative approaches to the international customer/market selection, International Business Review, 11, (3), 347-63.

Andersson, P. (2002) Connected internationalisation processes: the case of internationalising channel intermediaries, International Business Review, 11, 365-383.

Andersson, S. and Wictor, I. (2003) Innovative internationalisation in new firms: born globals – the Swedish case, Journal of International Entrepreneurship, 1, (3), 249-75.

Andersson, S. (2000) The internationalization of the firm from an entrepreneurial perspective, International Studies of Management & Organization, 30, 63-92.

Andrews, K. R. (1987) The Concept of Corporate Strategy, Homewood: Irwin.

Arbix, G., Salerno, M.S., and De Nigri, J.A. (2004) Inovação, via internacionalização, faz bem para as exportações brasileiras [online], Instituto de Pesquisa Econômica Aplicada – IPEA, Texto para Discussão, 1023. Available from: <http://www.ipea.gov.br> (accessed 14th January 2008).

Arenius, P. (2005) The psychic distance postulate revised: from market selection to speed of market penetration, Journal of International Entrepreneurship, 3, (2), 115–131.

Arino, A. (2001) To do or not to do? Noncooperative behaviour by commission and omission in interfirm ventures, Group & Organisation Management, 26, 4-23.

Arora, A. and Athreye, S. (2002) The software industry and India's economic development, Information Economics and Policy, 14, 253–273.

Arora, A. and Gambardella, A. (2004) The Globalisation of the software industry: perspectives and opportunities for developed and developing countries [online], NBER Working Papers 10538, National Bureau of Economic Research, Inc. Available from: <http://www.nber.org/>(accessed 22nd June 2007).

Aspelund, A., Madsen, T. K. and Moen, O. (2007) A review of the foundation, international marketing strategies, and performance of international new ventures, European Journal of Marketing, 41, (11/12), 1423-1448.

Axelsson, B. (1992) Corporate strategy models and networks – diverging perspectives. In Industrial Networks: A New View of Reality, (eds. Axelsson, B. and Easton, G.), Routledge, London, 184-204.

Axelsson, B. and Easton, G. (1992) Industrial Networks: A New View of Reality, Routledge, London.

Axelsson, B. and Johanson, J. (1992) Foreign market entry – the textbook vs. the network view. In Industrial Networks: A New View of Reality, (eds. Axelsson, B. and Easton, G.), Routledge, London, 218-234.

Balabanis, G. I. and Katsikea, E.S. (2003) Being an entrepreneurial exporter: does it pay? International Business Review, 12, 233–252.

Baldauf, A., Cravens, D. W., and Wagner, U. (2000) Examining determinants of export performance in small open economies, Journal of World Business, 35, (1), 61-79.

Baldoni, G. L. (2001) Networks of SMEs and electronic commerce: impact of ICTs on small and medium enterprises, Digital Economy: Policies Exchange and Development for SMEs – Deeds, DEEDS - IST 1999-29035, Business Organisation Networks in the Digital Economy - 1st Thematic Workshop.

Bardhan, A. D. and Kroll, C. A. (2006) Competitiveness and an emerging sector: the Russian software industry and its global linkages, Industry and Innovation, 13, (1), 69-95.

Barrett, N.J and Wilkinson, I.F. (1985) Export stimulation: a segmentation study of the exporting problems of Australian manufacturing firms, European Journal of Marketing, 19, (2), 53-72.

Barney, J. (1991) Firm resources and sustained competitive advantage, Journal of Management, 17, (1), 99-120.

Beamish, P. W. (1990) The Internationalisation process for smaller Ontario firms: a research agenda. In Research in global strategic management - international business research for the twenty-first century: Canada's new research agenda, (ed. Rugman, A. M.), JAI Press Inc, Greenwich, 77-92.

Behrens, A. (2003) Brazilian software: the quest for an export-oriented business strategy, DRC Working Papers, Global Software from Emerging Markets. Centre for New and Emerging Markets, London Business School, No. 21.

Bell, J. (1995) The internationalization of small computer software firms. A further challenge to "stage" theories, European Journal of Marketing, 29, (8), 60-75.

Bell, J. (1997) A comparative study of the export problems of small computer software exporters in Finland, Ireland and Norway, International Business Review, 6, (6), 585-604.

Bell, J. and Young, S. (1998) Toward an integrative framework on the internationalisation of the firm, In Internationalisation: Process, Context, and Markets, (eds. Hooley, G., Loveridge, R. and Wilson, D.), MacMillan, London, 5-28.

Bell, J., Crick, D. and Young, S. (2004) Small firm internationalisation and business strategy: an exploratory study of "knowledge-intensive" and "traditional" manufacturing firms in the UK, International Small Business Journal, 22, (1), 23-56.

Bengtsson, M. and Kock, S. (2000) "Coopetition" in business networks — to cooperate and compete simultaneously, Industrial Marketing Management, 29, 411–426.

Bernal, S. M. H., Burr C., and Johnsen, R.E. (2002) Competitor networks: international competitiveness through collaboration: the case of small freight forwarders in the high-tech forwarder network, International Journal of Entrepreneurial Behaviour & Research, 8, (5), 239 – 253.

Bertini, S. (1998) Il settore del mobile imbottito a Forlì, Ires, Rome, mimeo.

Bilkey, W. and Tesar, G. (1977) The export behaviour of smaller seized Wisconsin manufacturing firms, Journal of International Business Studies, 8, 93-98.

Björkman, I. and Kock, S. (1997) Inward international activities in service firms – illustrated by three cases from the tourism industry. International Journal of Service Industry Management, 8, (5), 362-376.

Björkman, I. and Forsgren, M. (2000) Nordic international business research, International Studies of Management & Organization, 30, (1), 6-24.

Blankenburg, D. (1995) A network approach to foreign market entry In Business Marketing: An Interaction and Network Perspective, (eds, Wilson, D.T. and Moller, K.) Kluwer Academic Publishers, Dordrecht.

Bloodgood, J. U. M., Sapienza; H. J. and Almeida, J. (1996) The internationalization of new potential US ventures: antecedents and outcomes, Entrepreneurship Theory & Practice, 61-76.

Blonigen, B. (2005) A review of the empirical literature on FDI determinants, Atlantic Economic Journal, 33, 383-403.

Bonaccorsi, A. (1992) On the relationship between firm size and export intensity, Journal of International Business Studies, 23, (4), 605-636.

Borg, I. and Groenen, P.J.F. (2005) Modern multidimensional scaling: theory and applications. Springer, 2nd Edition.

Borgatti, S.P. and Foster, P.C. (2003) The network paradigm in organizational research: a review and typology, Journal of Management, 29, (6), 991–1013.

Boschma, R. A. (2005) Proximity and Innovation: A Critical Assessment, Regional Studies, 39, (1), 61–74.

Boschma, R. A. and Ter Wal, A. L.J. (2005) Knowledge networks and innovative performance in an industrial district. The case of a footwear district in the south of Italy [online], Available from: <http://researchgroup.geo.uu.nl/index.php?groupid=51> (accessed 2nd June 2008).

Botelho, A. J., Stefanuto, G., Spinosa, M. and Veloso, F. (2002) The software industry in Brazil: Strengthening the Knowledge Economy, Campinas, Softex.

Botelho, A. J., Stefanuto, G., and Veloso, F. (2005) The Brazilian Software Industry In From Underdogs to Tigers: The Rise and Growth of the Software Industry in Some Emerging Economies, (eds. Arora, A. and Gambardella, A.), Oxford: Oxford University Press, 99-130.

Botelho, A. J. J., Dedrick, J., Kraemer, K. L. and Tigre, P. B. (1999) From industry protection to industry promotion: to industry promotion: IT policy in Brazil [online], Center for Research on Information Technology and Organizations, University of California, Irvine, Available from: <http://www.crito.uci.edu/git/publications/pdf/brazil-case-10-99.pdf> (accessed 2nd June 2008).

Botelho, A. J. and Tigre, P. B. (2005) Information and Communication Technology (ICT) for development of small and medium-sized exporters in Latin America: Brazil, United Nations Publication, CEPAL – Project document.

Braunsberger, K., Gates, R. and Ortinau, D. J. (2005) Prospective respondent integrity behaviour in replying to direct mail questionnaires: a contributor in overestimating nonresponse rates, Journal of Business Research, 58, 260– 267.

Brown, T. E., Davidsson, P. and Wiklund, J. (2001) An operationalisation of Stevenson's conceptualisation of entrepreneurship as opportunity-based firm behaviour, Strategic Management Journal, 22, 953-968.

Brunetto, Y. and Farr-Wharton, R. (2007) The moderating role of trust in SME owner/managers' decision-making about collaboration, Journal of Small Business Management, 45, (3), 362-387.

Brush, C., Edelman, L., Manolova, T. (2002) The impact of resources on small firm internationalisation, Journal of Small Business Strategy, 13, (1), 1-17.

Buckley, P. J. (1993) Direct investment by small and medium-sized enterprises: the theoretical background, In The Internationalization of the Firm, (eds. Buckley, P. J. and Ghauri, P. N.), Dryden Press, London, 91-105.

Buckley, P. and Casson, M. C. (1976) The future of the multinational enterprise, Macmillan, London.

Buckley, P. J. and Casson, M.C.(1998) Models of the multinational enterprise, Journal of International Business Studies, 29, 21-44.

Buckley, P. J., Casson, M.C., and Gulamhussen, M.A. (2002) Internationalisation – real options, knowledge management and the Upsalla approach. In Critical Perspectives on Internationalization, (eds. Havila, V., Forsgren, M., and Hakansson, H.), Pergamon, Oxford, 229-261.

Buckley, P. J., Clegg, J. and Tan, H. (2006) Cultural awareness in knowledge transfer to China — The role of guanxi and mianzi, Journal of World Business, 41, 275–288.

Buckley, P.J., Devinney, T.M. and Louviere, J.J. (2007) Do managers behave the way theory suggests? A choice-theoretic examination of foreign direct investment location decision-making, Journal of International Business Studies, 38, 1069-1094.

Buckley, P. J. and Hashai, N. (2005) Firm configuration and internationalisation: A model, International Business Review, 14, 655–675.

Buckley, P. J. and Mirza, H. (1997)The Case of the United Kingdom, In International Technology Transfer by Small and Medium-Sized Enterprises. Country Studies, (eds. Buckley, P. J., Campos, J., Mirza, H. and White, E.), McMillan Press Ltd, London, 1-5.

Budd, J. M. (2005) Phenomenology and information studies, Journal of Documentation, 61, (1), 44-59.

Business Software Alliance – BSA (2007) Fifth annual BSA and IDC global software piracy study [online], Available from: <http://global.bsa.org/idcglobalstudy2007/>(accessed 14th February 2009).

Calof, J. L. (1993) The impact of size on internationalization, Journal of Small Business Management, 31, 60-69.

Calof, J. L. (1994) The Relationship between Firm Size and Export Behaviour Revisited, Journal of International Business Studies, 25, (2), 367-387.

Calof, J. L. and Beamish, P. (1995) Adapting to foreign markets: explaining internationalisation, International Business Review, 4, (2), 115-131.

Campbell, D. T. (1955) The informant in quantitative research, American Journal of Sociology, 60, 339-342.

Caniëls, M. C. J. and Gelderman, C. J. (2007) Power and interdependence in buyer supplier relationships: a purchasing portfolio approach, Industrial Marketing Management, 36, 219-229.

Carmel, E. (2003a) Taxonomy of new software exporting nations, The Electronic Journal on Information Systems in Developing Countries, 13, (2), 1-6.

Carmel, E. (2003b) The new software exporting nations: impacts on national well being resulting from their software exporting industries, The Electronic Journal on Information Systems in Developing Countries, 13, (3), 1-6.

Carmel, E. (2003c) The new software exporting nations: success factors, The Electronic Journal on Information Systems in Developing Countries, 13, (4), 1-12.

Carson, D. and Gilmore, A. (2000) SME marketing management competencies, International Business Review, 9, 363–382.

Castilla, E., Hwang, H., Granovetter, E. and Granovetter, M. (2000) Social networks in Silicon Valley In The Silicon Valley Edge (eds. Lee, C., Miller, W. F., Hancock, M. G., and Rowen, H. S.), Stanford: Stanford University Press, 218-247.

Cavusgil, S.T. (1980) On the internationalisation process of firms, European Research, 8, 273-281.

Cavusgil, S.T. and Naor, J. (1987) Firm and Management Characteristics as Discriminators of Export Marketing Activity, Journal of Business Research, 15, (3), 221-235.

Cavusgil, S. T. and Zou, S. (1994) Marketing strategy-performance relationship: an investigation of the empirical link in export market ventures, Journal of Marketing, 58, 1-21.

Chandler, A.D. (1962) Strategy and structure, Cambridge, MA: MIT Press.

Cheng, H-L. and Yu, C-H. J. (2008) Institutional pressures and initiation of internationalization: evidence from Taiwanese small- and medium-sized enterprises, International Business Review, 17, (3), 331-348.

Chetty, S. K. (1999) Dimensions of internationalisation of manufacturing firms in the apparel industry, European Journal of Marketing, 33, (1/2), 121-142.

Chetty, S. K. and Campbell-Hunt, C. (2003) Explosive international growth and problems of success amongst small to medium-sized firms, International Small Business Journal, 21, (1), 61-81.

Chetty, S. and Eriksson, K. (2002) Mutual commitment and experiential knowledge in mature international business relationship, International Business Review, 11, 305–324.

Chetty, S. K. and Holm, D. B. (2000) Internationalisation of small to medium-sized manufacturing firms: a network approach, International Business Review, 9, 77-93.

Chetty, S. K. and Wilson, H.I.M., (2003) Collaborating with competitors to acquire resources, International Business Review, 12, 61-81.

Child, J. and Faulkner, D. (1998) Strategies of Co-operation: Managing Alliances, Networks, and Joint Ventures, Oxford University Press, Oxford.

Cohen, J. (1988) Statistical Power Analysis for the Behavioural Sciences, 2nd ed. Hillsdale, NJ: Lawrence Erlbaum Publishing.

Collinson, S. and Houlden, J. (2005) Decision-making and market orientation in the internationalization process of small and medium-sized enterprises, Management International Review, 45, 413-436.

Commander, S. (2005) The Software Industry in Emerging Markets: Origins and Dynamics, Edward Elgar Publishing.

Contractor, F. J. and Kundu, S. (2004) The role of export-driven entrepreneurship in economic development: A comparison of software exports from India, China, and Taiwan, Technological Forecasting & Social Change, 71, 799–822.

Cook, K. S. and Emerson, R. (1978) Power, equity and commitment in exchange networks, American Sociological Review, 43, 712-739.

Corò, G. (1999) Distritos e Sistemas de Pequena Empresa na Transição In Empresários e Empregos nos Novos Territórios Produtivos. O caso da Terceira Itália, (eds. Urani, A., Cocco, G. and Galvão, A.), DP&A, Rio de Janeiro, 147-197.

Corrar, L. J., Paulo, E. and Dias, J. M. (2007) Análise Multivariada para Administração, Contabilidade e Economia. Atlas, São Paulo.

Correa, C. M. (1996) Strategies for software exports from developing countries, World Development, 24, (1), 171-182.

Coviello, N. and McAuley, A. (1999) Internationalisation and the smaller firm: A Contemporary Empirical Research, Management International Review, Third Quarter 1999, Wiesbaden.

Coviello, N.E. and Munro, H.J. (1995). Growing the entrepreneurial firm: networking for international market development, European Journal of Marketing, 29, (7), 49-61.

Coviello, N. and Munro, H. (1997) Network relationships and the internationalisation process of small software firms, International Business Review, 6, (4), 361-386.

Covin, J., and Slevin, D. (1989) Strategic management of small firms in hostile and benign environments, Strategic Management, 10, 75–87.

Cowles, D. L., Kiecker, P., and Little, M. W. (2002) Using key informant insights as a foundation for e-retailing theory development, Journal of Business Research, 55, 629– 636.

Crick, D. (2004) UK SMEs' decision to discontinue exporting: an exploratory investigation into practices within the clothing industry, Journal of Business Venturing, 19, 561-687.

Crick, D. and Jones, M. (2000) Small high-technology firms and international high-technology markets, Journal of International Marketing, 8, (2), 63-85.

Crick, D. and Spence, M (2005) The internationalisation of 'high performing' UK high-tech SMEs: a study of planned and unplanned strategies, International Business Review, 14, 167–185.

Cruickshank, J. (2007) The usefulness of fallibilism in post-positivist philosophy: a Popperian critique of critical realism, Philosophy of the Social Sciences, 37, (3), 263-288.

Culpan, R. (1989) Export behaviour of firms: Relevance of firm size, Journal of Business Research, 18, (3), 207-218.

Cunningham, M. and Culligan, K. (2002) Competitiveness through networks or relationships in information technology product markets, Understanding Business Markets, 2nd.ed., Dryden, London.

Da Silva, P. A. and Da Rocha, A. (2001) Perception of export barriers to Mercosur by Brazilian firms, International Marketing Review, 18, (6), 589-610.

Davidson, W. H. (1980) The location of foreign direct investment activity: country characteristics and experience effects, Journal of International Business Studies, 11, (2), 9-22.

Davidsson, P. and Honig, B. (2003) The role of social and human capital among nascent entrepreneurs, Journal of Business Venturing, 18, 301–331.

Dayasindhu, N. (2002) Embeddedness, knowledge transfer, industry clusters and global competitiveness: a case study of the Indian software industry, Technovation, 22, 551–560.

Dedrick, J., Kraemer, K.L., Palacios, J.J., Tigre, P.B., and Botelho, A.J.J. (2001) Economic liberalization and the computer software industry: comparing outcomes in Brazil and Mexico, World Development, 29, (7), 1199-1214.

Deng, P. (2007) Investing for strategic resources and its rationale: The case of outward FDI from Chinese companies, Business Horizons, 50, 71—81.

Dennis, C. (2000) Networking for marketing advantage, Management Decision, 38, (4), 287-292.

Di Gregorio, D., Musteen, M. and Thomas, D.E. (2009) Offshore outsourcing as a source of international competitiveness for SMEs, Journal of International Business Studies, 40, 969-988.

Dib, L. A. (2008) O processo de internacionalização de pequenas e médias empresas e o fenômeno born global: estudo do setor de software no Brasil, doctoral thesis, Universidade Federal do Rio de Janeiro, Instituto COPPEAD de Administração.

Dib, L. A., Da Rocha, A. and Da Silva, J. F. (2008) The internationalization process of Brazilian software firms and the born global phenomenon: examining firm, network and entrepreneur variables, 2008 Annual CInMar Conference – Consortium for International Marketing Research, Rio de Janeiro, Brazil.

DIEESE (2008) Política de Desenvolvimento Produtivo. Nova política industrial do governo [online], Nota Técnica, 67, Available from: <http://www.dieese.org.br/home.xml>. (accessed 24th February 2009).

Dimitratos, P., Lioukas, S., and Carter, S. (2004) The relationship between entrepreneurship and international performance: the importance of domestic environment, International Business Review, 13, (1), 19-41.

DTI (2007) Business services and globalisation [online] DTI Economics Paper 19, Available from: <http://www.berr.gov.uk/files/file37006.pdf>/(accessed 21st February 2009).

Dubini, P. and Aldrich, H. (1991) Personal and extended networks are central to the entrepreneurial process, Journal of Business Venturing, 6, 306–313.

Dubois, A., Hulthén, K. and Pedersen, A-C. (2004) Supply chains and interdependence: a theoretical analysis, Journal of Purchasing & Supply Management, 10, 3-9.

Dunning, J. H. (1988) The eclectic paradigm of international production: a restatement and some possible extensions, Journal of International Business, 19, (1), 1-31.

Dunning, J.H. (1993) Multinational Enterprises and the Global Economy, Addison-Wesley: New York.

Dyer, J. H. (2000) Collaborative advantage, Oxford, University Press.

Easton, G. (1992) Industrial networks: a review In Industrial Networks: A New View of Reality, (eds. Axelsson, B. and Easton, G.), Routledge, London, 1-27.

Easton, G. and Araujo, L. (1992) Non-economic exchange in industrial networks In Industrial Networks: A New View of Reality, (eds. Axelsson, B. and Easton, G.), Routledge, London, 62-84.

Ein-Dor, P., Myers, M., and Raman, K. S. (2004) IT industry development and the knowledge economy: a four country study, Journal of Global Information Management, 12, (4), 23-49.

Elango, B. and Pattnaik, C. (2007) Building capabilities for international operations through networks: a study of Indian firms, Journal of International Business Studies, 38, 541-555.

Ellis, P. (2000) Social ties and foreign market entry, Journal of International Business Studies, 31, (3), 443-469.

ENSR - European Network for SME Research (2003) Internationalisation of SMEs [online], European Observatory for SMEs 2003, No. 4, Available from: <http://europa.eu.int> (accessed 22nd July 2004).

Erdogan, B.Z. and Baker, M. J. (2002) Increasing mail survey response rates from an industrial population. A cost-effectiveness analysis of four follow-up techniques, Industrial Marketing Management, 31, 65–73.

Eriksson, K. and Chetty, S. (2003) The effect of experience and absorptive capacity on foreign market knowledge, International Business Review, 12, 673-695.

Eriksson, K., Johanson, J. and Majkgard, A. (1997) Experiential knowledge and cost in the internationalization process, Journal of International Business Studies, 28, (2), 337-360.

Erkko, A., Lummaa, H. and Arenius, P. (2002) Emergent "born globals": drafting early and rapid internationalization strategies in technology-based new firms, 2nd. International Conference of the Strategic Management Society, 22-25.

Estrada, S. and Heijis, J. (2006) Technological Behaviour and Export Probability in Developing Countries: The Case of Mexico, Science, Technology & Society, 11, (2), 271-317.

Faulkner, D. and De Rond, M. (2001) Perspectives on cooperative strategy In Cooperative Strategy. Economics, Business, and Organizational Issues, (eds. Faulkner, D. and De Rond, M.), Oxford University Press, Oxford, 3-39.

Filatotchev, I., Liu, X., Buck, T. And Wright, M. (2009) The export orientation and export performance of high-technology SMEs in emerging markets: the effects of knowledge-transfer by returnee entrepreneurs, Journal of International Business Studies, 40, (6), pp. 1005-1021.

Fillis, I. (2001) Small firm internationalisation: an investigative survey and future research directions, Management Decision, 39, (9), 767-783.

Fink, M., Harms, R. and Kraus, S. (2008) Cooperative internationalization of SMEs: self-commitment as a success factor for international entrepreneurship, European Management Journal, 26, 429-440.

Fioretti, G. (2008) Individual Contacts, Collective Patterns - Prato 1975-97, A Story of Interactions, Tinbergen Institute Discussion Paper No. 2002-109/3, Complex Systems Centre, University of Siena; International Centre for Economic Research (ICER).

Firestone, W. A. (1987) Meaning in method: the rhetoric of quantitative and qualitative research, Educational Researcher, 16, (7), 16-21.

Fisch, J. H. (2008) Internalisation and internationalization under competing real options, Journal of International Management, 14, 108–123.

Fletcher, R. (1996) Network theory and countertrade transactions, International Business Review, 5, (2), 167-189.

Fletcher, R. (2001) A holistic approach to internationalisation, International Business Review, 10, 25-49.

Fletcher, R. and Barrett, N. (2001) Embeddedness and the evolution of global networks. An Australian case, Industrial Marketing Management, 30, 561-573.

Flor, M. and Oltra, M. J. (2005) The influence of firms' technological capabilities on export performance in supplier-dominated industries: the case of ceramic tile firms, R&D Management, 35, (3), 333 – 347.

Fombrun, C.J. and Astley, W. G. (1983) Beyond Corporate Strategy, Journal of Business Strategy, 3, 47-54.

Ford, D. (2002) Solving old problems, learning new things and forgetting most of them: distribution, internationalisation and networks, International Marketing Review, 19, (3), 225 – 235.

Forsgren, M. (2002) The concept of learning in the Upsalla internationalization process model: a critical review, International Business Review, 11, (3), 257-278.

Forsgren, M. (1989) Managing the internationalization process – the Swedish case. London: Routledge.

Franco, M. J. B. (2003) Collaboration among SMEs as a mechanism for innovation: an empirical study, New England Journal of Entrepreneurship, 6, (1), 23-32.

Frankfort-Nachmias, C. and Nachmias, D. (1996) Research methods in the Social Sciences, 5th ed., St Martin's Press, London, UK.

Gadde, L-E. , Huemer, L. and Hakansson, H. (2003) Strategizing in industrial networks, Industrial Marketing Management, 5552, 1-8.

Garvey, D. and Brennan, L. (2006) The internationalisation of indigenous Irish software technology companies: an exploratory study, Irish Journal of Management, 26, (2), 81-108.

George, G., Wiklund, J. and Zahra, S. (2005) Ownership and internationalization of small firms, Journal of Management, 31, 210-233.

Gemser, G., Brand, M. J. and Sorge, A. (2004) Exploring the Internationalisation Process of Small Businesses: a study of Dutch old and new economy firms, Management International Review, 44, (2), 127-150.

Gibbons, J. D. (1993) Nonparametric measures of association. Quantitative applications in the social sciences series, Thousand Oaks, CA: Sage Publications.

Glückler, J. (2006) A relational assessment of international market entry in management consulting, Journal of Economic Geography, 6, 369–393.

Gomes, R. (2003) A Internacionalização das atividades tecnológicas pelas empresas transnacionais: elementos de organização industrial da economia da inovação, doctoral thesis, Instituto de Economia – IE/Unicamp.

Goulding, C. (2005) Grounded theory, ethnography and phenomenology: a comparative analysis of three qualitative strategies for marketing research, European Journal of Marketing, 39, (3/4), 294-308.

Gourlay, A., Seaton, J. and Suppakitjarak, J. (2005) The determinants of export behaviour in UK service firms, The Service Industries Journal, 25, (7), 879-889.

Granovetter, M. S. (1973) The strength of weak ties, American Journal of Sociology, 78, (6), 1360-1380.

Granovetter, M. (1985) Economic action and social structure: the problem of embeddedness, American Journal of Sociology, 91, (3), 481-510.

Granovetter, M. (1992) Economic action and social structure: the problem of embeddedness In The Sociology of Economic Life, (eds. Granovetter, M. and Swedberg, R.), Westview Press, Oxford, 53-81.

Granovetter, M. (2002) A theoretical agenda for Economic Sociology In The New Economic Sociology: Developments in an Emerging Field, (eds. M. F. Guillen, M.F., Collins, R., England, P. and Meyer, M.), New York: Russell Sage Foundation, 35-59.

Granovetter, M. (2005) The Impact of Social Structure on Economic Outcomes, Journal of Economic Perspectives, 19, (1), 33–50.

Granovetter, M. and Swedberg, R. (1992) The Sociology of Economic Life, Boulder, Westview Press, Oxford.

Green, R., Cunningham, J., Duggan, I., Giblin, M., Moroney, M. and Smyth, L. (2001) The boundaryless cluster: information and communications technology in Ireland In Innovative Clusters. Drivers of National Innovation Systems, (eds. By Hertog, P. Bergman, E. M. and Remoe, S.), Organisation for Economic Co-operation and Development - OECD, OECD Publishing, 47-58.

Groenen, P.J. F. and Van Der Lans, I. A. (2006) Multidimensional Scaling with Regional Restrictions for Facet Theory: An Application to Levi's Political Protest Data [online], Available from: <http://publishing.eur.nl/ir/repub/asset/8045/ERS-2006-057-MKT.pdf> (accessed 21st May 2010).

Guibert, N. (2006) Network governance in marketing channels. An application to the French Rhône Valley AOC wines industry, British Food Journal, 108, (4), 256-272.

Gulati, R. (1998) Alliances and networks, Strategic Management Journal, 19, (4), 293-317.

Gulati, R., Nohria, N., and Zaheer, A. (2000) Strategic networks, Strategic Management Journal, 21, 203-215.

Gunawan, J., Wilson, H., and Chetty, S. (2004) Organic and structured internationalization networks: position and perception of choice and determinism, Paper Submitted To Networks in Asia-Pacific Business Conference.

Guttman, R. and Greenbaum, C. W. (1998) Facet Theory: Its Development and Current Status, European Psychologist, 3, (1), 13-36.

Haahti, A., Madupu, V., Yavas, U. and Babakus, E. (2005) Cooperative strategy, knowledge intensity and export performance of small and medium sized enterprises, Journal of World Business, 40, 124–138.

Hadley, R. D. and Wilson, H. I. M. (2003) The network model of internationalisation and experiential knowledge, International Business Review, 12, (6), 697-717.

Hair, J.F., Black, W. C., Babin, B. J., Anderson, R. E. and Tatham, R. L. (2006) Multivariate Data Analysis, 6th Edition, Prentice Hall.

Hakansson, H. and Johanson, J. (1992) A model of industrial networks. In Industrial Networks: A New View of Reality, (eds. Axelsson, B. and Easton, G.), Routledge, London, 28-34.

Hakansson, H. and Snehota, I. (1995) Developing relationships in business networks. Routledge, London.

Halinen, A. and Törnroos, J-A. (1998) The role of embeddedness in the evolution of business networks, Scand. J. Mgmt, 14, (3), 187-205.

Halinen, A. and Törnroos, J-A. (2005) Using case methods in the study of contemporary business networks, Journal of Business Research, 58, 1285-1297.

Hansen, N., Gillespie, K. and Gencturk, E. (1994) SME's and export involvement: market responsiveness, technology, and alliances, Journal of Global Marketing, 7 (4), 7-27.

Hara, G. and Kanai, T. (1994) Entrepreneurial networks across oceans to promote international strategic alliances for small businesses, Journal of Business Venturing, 9, 489-507.

Harzing, A-W (1997) Response rates in international mail surveys: results of a 22-country study, International Business Review, 6, (6), 641-665.

Hashai, N. and Almor, T. (2004) Gradually internationalizing 'born global' firms: an oxymoron? International Business Review, 13, 465-483.

Hau, L. N. And Evangelista, F. (2007) Acquiring tacit and explicit marketing knowledge from foreign partners in IJVs, Journal of Business Research, 60, 1152-1165.

Healy, M. and Perry, C. (2000) Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm, Qualitative Market Research: An International Journal, 3, (3), 118-126.

Heeks, R. (1999) Software strategies in developing countries [online], Development Informatics, Working Paper Series, 6, Manchester: Institute for Development Policy and Management, Available from: http://www.sed.manchester.ac.uk/idpm/publications/wp/di/di_wp06.htm (accessed 13th February 2007).

Heeks, R. and Nicholson, B. (2002) Software export success factors and strategies in developing and transitional economies [online], Development Informatics, Working Paper Series, 12, Manchester: Institute for Development Policy and Management, Available from: http://www.man.ac.uk/idpm/idpm_dp.htm#devinf_wp/ (accessed 13th February 2007).

Heeks, R., Krishna, S., Nicholson, B. and Sahay, S. (2000) Synching or sinking: trajectories and strategies in global software outsourcing relationships [online], Development Informatics, Working Paper Series, 9, Manchester: Institute for Development Policy and Management, Accessed from: http://www.man.ac.uk/idpm/idpm_dp.htm#devinf_wp/ (accessed 13th February 2007).

Helfert, G., Ritter, T., and Walter, A. (2002) Redefining market orientation from a relationship perspective. Theoretical considerations and empirical results, European Journal of Marketing, 36, (9/10), 1119-1139.

Hertz, S. (1992) Towards more integrated industrial systems In Industrial Networks: A New View of Reality, (eds. Axelsson, B. and Easton, G.), Routledge, London, 105-124.

Hite, J. M. and Hesterly, W. S. (2001) The evolution of firm networks: from emergence to early growth of the firm, Strategic Management Journal, 22, 275-286.

Hoang, H. and Antoncic, B. (2003) Network-based research in entrepreneurship. A critical review, Journal of Business Venturing, 18, 165-187.

Holmlund, M., and Kock, S. (1998) Relationships and the internationalisation of Finnish small and medium-sized companies, International Small Business Journal, 16, (4), 46–63.

Holmlund, M., and Törnroos, J. (1997) What are relationships in business networks? Management Decision, 35, (4), 304-309.

IDG Now (2009) ABES registra apreensão de 1,6 milhão de softwares piratas em 2008. [online]. Available from: http://idgnow.uol.com.br/computacao_pessoal/2009/01/12/abes-registra-apreensao-de-1-6-milhao-de-sofware-piratas-em-2008/

Ivens, B. S. (2006) Identifying differences in foreign customers' relational behaviour: an exploratory study using multidimensional scaling In Advances in International Marketing (ed. Solberg, C. A.), Elsevier, Amsterdam, 245-266.

Jaworska, N. and Chupetlovska-Anastasova, A. (2009) A review of multidimensional scaling (MDS) and its utility in various psychological domains, Tutorials in Quantitative Methods for Psychology, 5, (1), 1-10.

Johannisson, B. and Monsted, M. (1997) Contextualizing entrepreneurial networking, International Studies of Management & Organisation, 27, (3), 109-136.

Johanson, J. and Vahlne, J-E. (1977) The internationalization process of the firm – a model of knowledge development and increasing foreign market commitments In The Internationalization of the Firm, (eds. Buckley, P. J. and Ghauri, P. N.), Dryden Press, London, 201-216.

Johanson, J. and Vahlne, J-E. (1990) The mechanism of internationalisation, International Marketing Review, 7, (4), 11-24.

Johanson, J. and Vahlne, J-E. (2003) Business relationship learning and commitment in the internationalisation process, Journal of International Entrepreneurship, 1, 83-101.

Johanson, J. and Vahlne, J-E. (2006) Commitment and opportunity development in the internationalization process: a note on the Upsalla internationalization process model, Management International Review, 46, (2), 165-178.

Johanson, J. and Vahlne, J-E. (2009) The Uppsala internationalization process model revisited: from liability of foreignness to liability of outsidership, Journal of International Business Studies, 40, (9), 1411-1431.

- Johanson, J. and Mattsson, L.-G. (1993) Internationalization in industrial systems – a network approach, strategies in global competition In The Internationalization of the Firm, (eds. Buckley, P. J. and Ghauri, P. N.), Dryden Press, London, 304-321.
- Johanson, J., and Mattsson, L.-G.(1988) Internationalisation in industrial systems – a network approach In Strategies in Global Competition, (eds. Hood, N., and Vahlne, J. E.), Croom Helm, New York, 287 – 314.
- Johanson, J. and Vahlne, J.-E.(1992) Management of foreign market entry, Scandinavian International Business Review, 1, (3), 9–27.
- Johnsen, R. E. and Johnsen, T. E. (1999)International market development through networks.The case of the Ayrshire knitwear sector, International Journal of Entrepreneurial Behaviour & Research, 5, (6), 297-312.
- Jones, M. V. (1999) The internationalisation of small UK high technology firms, Journal of International Marketing, 7, (4), 15-41.
- Jones, M. V. (2001) First steps in internationalisation. Concepts and evidence from a sample of small high-technology firms, Journal of International Management, 7, (3), 191-210.
- Jones, M. V. and Coviello, N.E. (2005) Internationalisation: conceptualizing an entrepreneurial process of behaviour in time, Journal of International Business Studies, 36, 284-303.
- Jones, C., Hesterly, W. S. and Borgatti, S. P. (1997) A general theory of network governance: exchange conditions and social mechanisms, Academy of Management Review, 22, (4), 911-945.
- Juma'h, A. H. (2006) Empirical and realistic approaches of research [online], Revista Empresarial Inter Metro/Inter Metro Business Journal, 2, (1), 88-108, Available from: [http://ceajournal.metro.inter.edu/artspring06.htm/\(accessed](http://ceajournal.metro.inter.edu/artspring06.htm/(accessed) 14th January 2008).
- Kalantaridis C. (1996) Local production networks in the global marketplace: entrepreneurial strategies in the garment industry of Macedonia, Greece, International Journal of Entrepreneurial Behaviour and Research, 2, (3), 12-28.
- Karlsen, T., Silseth, P. R., Benito, G.R.G., and Welch, L. S. (2003) Knowledge, internationalization of the firm, and inward–outward connections, Industrial Marketing Management, 32, 385– 396.
- Katsikeas, C.S. (1994) Export competitive advantages: the relevance of firm characteristics, International Marketing Review, 11, (3), 33-53.
- Kaufmann, F. (1995) Internationalization via co-operation: strategies of SME, International Small Business Journal, 13, (2), 27–33.
- Khandwalla, P. (1977) The design of organizations. New York: Harcourt Brace Jovanovich.
- Knight, G. A. (2001) Entrepreneurship and strategy in the international SME, Journal of International Management, 7, 155–171.

Knight, G. A., and Cavusgil, S.T. (1996) The born global firm: a challenge to traditional internationalisation theory In International Marketing, (eds. Cavusgil, S.T., and Madsen, T.K.), Advances, 8, JAI Press, London, 11-26.

Knight, G. A. and Cavusgil, S.T. (2004) Innovation, organizational capabilities, and the born-global firm, Journal of International Business Studies, 35, 124–141.

Knowles, D., Mughan, T. and Lloyd-Reason, L. (2006) Foreign language use among decision-makers of successfully internationalised SMEs. Questioning the language-training paradigm, Journal of Small Business and Enterprise Development, 13, (4), 620-641.

Kohn, T. O. (1997) Small firms as international players, Small Business Economics, 9, 45-51.

Korhonen, H., Luostarinen, R. and Welch, L. (1996) Internationalization of SMEs: Inward-outward patterns and government policy, Management International Review, 36, (4), 315-329.

Kruskal, J. B. and Wish, M. (1978) Multidimensional Scaling. Beverly Hills, CA: Sage.

Kubota, L. C. (2006) Desafios para a indústria de software [online], Instituto de Pesquisa Econômica Aplicada – IPEA, Texto para Discussão No. 1150, Available from: <http://www.ipea.gov.br>. (accessed 20th June 2008).

Kwon, Y-C. and Knopa, L. J. (1993) Impact of host country market characteristics on the choice of foreign market entry mode, International Marketing Review, 10, (2), 60-76.

Larson, A. (1991) Partner networks: leveraging external ties to improve entrepreneurial performance, Journal of Business Venturing, 6, 173–188.

Lassila, A., Jokinen, J-P., Nylund, J., Huurinainen, P., Maula, M. and Kontio, J. (2006) Finnish software product business: results of the national software industry survey [online], Centre of Expertise for Software Product Business, Helsinki University of Technology, Institute of Strategy and International Business, Available from: www.swbusiness.fi (accessed 4th June 2007).

Lecocq, X. and Yami, S. (2002) From value chain to value networks: toward a new strategic model In International Business Network Knowledge, (ed. M. Lundan-Sarianna, M.), Cheltenham, UK and Northampton, MA, USA: Edward Elgar, 9-27.

Lefebvre, E. Lefebvre, L.A. and Préfontaine, L. (1999) The Role of Technological Capabilities in the Internationalization of R&D Intensive SMEs, Proceedings of the 32nd Hawaii International Conference on System Sciences – 1999.

Leonidou, L. C. and Katsikeas, C. S. (1996) The export development process: an integrative review of empirical models, Journal of International Business Studies, 27, (3), 517-551.

Lin, B-W., Li, P-C., and Chen, J-S. (2006) Social capital, capabilities, and entrepreneurial strategies: a study of Taiwanese high-tech new ventures, Technological Forecasting & Social Change, 73, 168-181.

Lindqvist, M. (1988) Internationalization of small technology-based firms: three illustrative case studies on Swedish firms, Stockholm School of Economics Research Paper 88/15.

Liu, X., Siler, P., Wang, C. and Wei, Y. (2000) Productivity spillovers from foreign direct investment: evidence from UK industry level panel data, Journal of International Business Studies, 31, (3), 407-425.

Liu, X., Xiao, W., and Huang, X. (2008) Bounded entrepreneurship and internationalisation of indigenous Chinese private-owned firms, International Business Review, 17, 488–508.

Lloyd-Reason, L. and Mughan, T. (2002) Strategies for internationalisation within SMEs: the key role of the owner-manager, Journal of Small Business and Enterprise Development, 9, (2), 120-129.

Lloyd-Reason, L. and Sear, L. (2007) Trading Places--SMEs in the Global Economy: A Critical Research Handbook, Edward Elgar Publishing.

Loane, S. and Bell, J. (2006) Rapid internationalisation among entrepreneurial firms in Australia, Canada, Ireland and New Zealand, International Marketing Review, 23, (5), 467-485.

Lorenzoni, G. and Ornati, O. A. (1988) Constellations of firms and new ventures, Journal of Business Venturing, 3, 41–57.

Lu, J. W. and Beamish, P. W. (2001) The internationalization and performance of SMEs, Strategic Management Journal, 22, (6-7), 565-586.

Lumpkin, G. T. and Dess, G.G. (1996) Clarifying the entrepreneurial orientation construct and linking it to performance, The Academy of Management Review, 21, (1), 135-172

Luo, X., Zhou, L., and Liu, S. S. (2005) Entrepreneurial firms in the context of China's transition economy: an integrative framework and empirical examination, Journal of Business Research, 58, 277-284.

Luo, Y. (2000) Dynamic capabilities in international expansion, Journal of World Business, 35, (4), 355-378.

Luostarinen, R. (1980) Internationalization of the firm, Helsinki: Helsinki School of Economics.

Madhok, A. (1997) Cost, value and foreign market entry mode: the transaction and the firm, Strategic Management Journal, 18, 39-61.

Madsen, T. K. and Servais, P. (1997) The Internationalization of Born Globals: an Evolutionary Process? International Business Review, 6, (6), 561-583.

Madsen, T.K., Rasmussen, E. and Servais, P. (2000) Differences and similarities between born globals and other types of exporters, Advances in International Marketing, 10, 247–265.

Magalhães, D., Knight, P. and Costa, E. (2009) Will the soccer world cup of 2014 help bridge the social gap through the promotion of ICT and e-government in Brazil?

In The Global Information Technology Report 2008–2009. Mobility in a Networked World, (eds. Dutta, S. and Mia, I.), World Economic Forum and INSEAD, Geneva, 133-143.

Malmberg, A. and Maskell, P. (1997) Towards an explanation of regional specialization and industry agglomeration, European Planning Studies, 5, (1), 25-41.

Markand, J. and Truffer, B. (2008) Technological innovation systems and the multi-level perspective: towards an integrated framework, Research Policy, 37, 596-615.

Marron, D. B. and Steel, D. G. (2000) Which countries protect intellectual property? The case of software piracy. Economic Inquiry, 38, (2), 159-174.

Marshall, A. (1890) Principles of Economics, London: Macmillan, Quoted from the eighth edition London: Macmillan 1920.

Massachusetts Institute of Technology – MIT (2002) The Software Industry in Brazil – 2002. Strengthening the Economy of Knowledge. MIT Project - Softex - W-Class.

Mathews, J.A. (2002) Accelerated internationalization from the periphery In Network Knowledge in International Business, (ed. Lundan, S. M.), Edward Elgar, UK.

McEvily, B. and Zaheer, A. (1999) Bridging ties: a source of firm heterogeneity in competitive capabilities, Strategic Management Journal, 20, 1133-1156.

McDougall, P.P. and Oviatt, B.M. (1996) New venture internationalization, strategic change, and performance: a follow-up study, Journal of Business Venturing, 11, (1), 23-40.

McDougall, P.P., Shane, S., and Oviatt, B.M. (1994) Explaining the Formation of International New Ventures, Journal of Business Venturing, 9, (6), 469-487.

McDougall, P. P., Oviatt, B.M. and Shrader, R. (2003) A comparison of international and domestic new ventures, Journal of International Entrepreneurship, 1, (1), 59-82.

McGorry, S. Y. (2000) Measurement in a cross-cultural environment: survey translation issues, Qualitative Market Research: An International Journal, 3, (2), 74-81.

McLoughlin, D. and Horan, C. (2002) Markets-as-networks: notes on a unique understanding, Journal of Business Research, 55, 535-543.

McManus, A. D. and Floyd, D. (2005) The global software industry, Management Services, 49, (2), 26-31.

Melin, L. (1992) Internationalization as a strategy process, Strategic Management Journal, 13, 99-118.

Messeghem, K. (2003) Strategic Entrepreneurship and Managerial Activities in SMEs, International Small Business Journal, 21, (2), 197-212.

Meyer, K. and Skak, A. (2002) Networks, serendipity and SME entry into Eastern Europe, European Management Journal, 20, (2), 179–188.

Meyer-Stamer, J. (1999) From Industrial Policy to Regional and Local Locational Policy: Experience from Santa Catarina/Brazil, Bulletin of Latin American Research, 18, (4), 451-468.

Miller, D., and Friesen, P. (1984) Organizations: A Quantum View. Prentice-Hall, Englewood Cliffs, NJ.

Mingoti, S. A. (2005) Análise de dados através de métodos de estatística multivariada: uma abordagem aplicada, Ed. UFMG, Belo Horizonte.

Ministério da Ciência e Tecnologia - MCT (2005) Qualidade e Produtividade no Setor de Software Brasileiro: Pesquisa 2005. [online], Available from: http://www.mct.gov.br/upd_blob/3662.pdf (accessed 15 January 2007).

Ministério da Ciência e Tecnologia - MCT (2001) Qualidade e Produtividade no Setor de Software Brasileiro: Pesquisa 2001 [online], Available from: <http://www.mct.gov.br/index.php/content/view/3254.html/> (accessed 15 January 2007).

Ministério da Ciência e Tecnologia – MCT (1993) Estudo da Competitividade da Indústria Brasileira, Competitividade da Indústria de Software [online], Nota Técnica Setorial do Complexo Eletrônico, IE/UNICAMP - IEI/UFRJ - FDC – FUNCEX, Available from: <http://www.mct.gov.br/index.php/content/view/73431.html/> (accessed 15 January 2007).

Ministério da Justiça (2006) National Council on Combating Piracy Third Report on Activities, Brazil [online], Available from: <http://www.mj.gov.br/data/Pages/MJ7DB451B5ITEMID911BEE061103415AB6EE6CF153D50A0EPTBRIE.htm/> (accessed 14th February 2009).

Mittelstaedt, J. D., Ward, W. and Nowlin, E. (2006) Location, industrial concentration and the propensity of small US firms to export, International Marketing Review, 23, (5), 486-503.

Mohr, J.J. and Sengupta, S. (2002) Managing the paradox of inter-firm learning: the role of governance mechanisms, Journal of Business & Industrial Marketing, 17, (4), 282-301.

Möller, K. and Halinen, A. (1999) Business relationships and networks: managerial challenge of network era, Industrial Marketing Management, 28, 413-427.

Morgan, R.E. and Katsikeas, C. (1997) Theories of international trade, foreign direct investment and firm internationalization: a critique, Management Decision, 35, (1), 68-78.

Mort, G. S. and Weerawardena, J. (2006) Networking capability and international entrepreneurship. How networks function in Australian born global firms, International Marketing Review, 23, (5), 549-572.

Muûls, M. and Pisu, M. (2009) Imports and Exports at the Level of the Firm: Evidence from Belgium, The World Economy, 32, (5), 692-734.

Nakamura, M., Vertinsky, I. and Zietsma, C. (1997) Does culture matter in inter-firm cooperation? Research consortia in Japan and the USA, Managerial and Decision Economics, 18, 153-175.

Nassimbeni, G. (1998) Network structures and co-ordination mechanisms, International Journal of Operations and Production Management, 18, (6), 538-554.

Nichter, S. and Goldmark, L. (2009) Small firm growth in developing countries, World Development, 37, (9), 1453-1464.

Nowack, M. J. and Grantham, C.E. (2000) The virtual incubator: managing human capital in the software industry, Research Policy, 29, 125–134.

OECD (1998) The software sector: a statistical profile for selected OECD countries. DSTI/ICCP/AH(97)4/REV1.

OECD (2004) Facilitating SMEs access to international markets, Background document for the 2nd Conference of Ministers Responsible for Small and Medium-Sized Enterprises (SMEs). Istanbul, Turkey.

OECD (2004) OECD Information Technology Outlook [online], Available from: <http://www.oecd.org/dataoecd/22/18/37620123.pdf>/(accessed 21st February 2009).

OECD (2009) Innovation in the Software Sector [online], Available from: <http://browse.oecdbookshop.org/oecd/pdfs/browseit/9309051E.PDF> (accessed 25th June 2010).

O'Farrell, P. N. and Wood, P. A. (1999) Formation of strategic alliances in business services: Towards a new client-oriented conceptual framework, The Services Industries Journal, 19, (1), 133–151.

Ojala, A (2008) Entry in a psychically distant market: Finnish small and medium-sized software firms in Japan, European Management Journal, 26, 135– 144.

Ojala, A (2009) Internationalization of knowledge-intensive SMEs: The role of network relationships in the entry to a psychically distant market, International Business Review, 1-10.

Ojo, A., Basanya, R., Janowski, T. and Reed, M. (2007) South-south cooperation in software technology. United Nations University International Institute for Software Technology - UNU-IIST, Report No. 371.

Oliver, C. (1990) Determinants of interorganizational relationships: Integration and future directions, Academy of Management Review, 15, (2), 241-265.

Olsen, W. (2001) Objectivity in Question In Module 3 Philosophy of Research in Social Sciences and Humanities, Bradford: The University of Bradford Graduate School, 13-28.

Olsen, W. and Morgan, J. (2004) A critical epistemology of analytical statistics: addressing the sceptical realist, Paper presented to the British Sociological Association, York.

Overby, J. W. and Min, S. (2001) International supply chain management in an internet environment. A network-oriented approach to internationalization, International Marketing Review, 18, (4), 392-420.

Oviatt, B.M. and McDougall, P.P. (1994) Toward a theory of international business studies, Journal of International Business Studies, 25, (1), 45–64.

Oviatt, B.M. and McDougall, P.P. (1997) Challenges for internationalization process theory: the case of international new ventures, Management International Review, 37, (2), 85-99.

Oviatt, B. M. and McDougall, P. P. (2005) The internationalization of entrepreneurship, Journal of International Business Studies, 36, 2-8.

Pangarkar, N. (2008) Internationalization and performance of small and medium-sized enterprises, Journal of World Business, 43, 475-485.

Peng, C-Y. J., Lee, K. L., and Ingersoll, G. M. (2002) An Introduction to Logistic Regression Analysis and Reporting, The Journal of Educational Research, 96, (1), 3-14.

Peng, M.W., and Luo, Y. (2000) Managerial ties and firm performance in a transition economy: the nature of a micro-macro link, Academy of Management Journal, 43, (3), 486-501.

Penrose, E. T. (1959) The theory of the growth of the firm, New York: Wiley.

Pereira, J. M., Marcelino, G.F. and Kruglianskas, I. (2006) Brazilian new patterns of an industrial, technological and foreign trade policy. Journal of Technology Management and Innovation, 1, (3), 17-28.

Perry, M. (1999) Small Firms and Network Economies, Routledge, London.

Perry, C., Riege, A. and Brown, L. (1999) Realism's role among scientific paradigms in marketing research, Irish Marketing Review, 12, (2), 16-23.

Pett, T. L., Francis, J. D, and Wolff, J. A. (2004) Examining SME internationalization motives as an extension of competitive strategy, Journal of Business and Entrepreneurship, 16, (1), 46-65.

Pfeffer, J. and Salancik, G. R. (1978) The external control of organizations: a resource dependence perspective, New York, NY, Harper and Row.

Pietrobelli, C. (2002) Industrial districts' evolution and technological regimes: Italy and Taiwan, Available from: [http: www.ie.ufrj.br/redesist/](http://www.ie.ufrj.br/redesist/) (accessed 24th February 2003)

Pietrobelli, C. and Rabellotti, R. (2006) Upgrading to compete. Global Value Chains, Clusters, and SMEs in Latin America, Inter-American Development Bank, Washington.

Porter, M. E. (ed.) (1998) Clusters and Competition: New Agendas for Companies, Governments, and Institutions In On Competition, Harvard Business School Publishing, Boston, 197-287.

Potter, G. (2003) Critical realist strengths and weaknesses, In Critical Realism: the difference that it makes, (ed. Cruickshank, J.), Routledge, London and New York, 161-165.

Provan, K.G., Fish, A. and Sydow, J. (2007) Interorganizational networks at the network level: a review of the empirical literature on whole networks, Journal of Management, 33, (3), 479-516.

Quintana-Garcia, C. and Benavides-Velasco, C. A. (2004) Cooperation, competition, and innovative capability: a panel data of European dedicated biotechnology firms, Technovation, 24, 927-938.

Rabellotti, R. and Schmitz, H (1999) The Internal Heterogeneity of Industrial Districts in Italy, Brazil and Mexico, Regional Studies, 33, 97-108.

Reddy, P. (2000) Interfirm cooperation: trends, practices and policy options In Development Strategies and Support Services for SMES: Proceedings of Four Intergovernmental Expert Meetings, (ed. UNCTAD), I, 121-132.

Reuters (2009) Get a deep insight into the Brazil telecom industry report, 2008. [online]. Available from: <http://www.reuters.com/article/pressRelease/idUS133345+13-May-2009+BW20090513>

Rialp, A., Rialp, J. and Knight, G. A. (2005) The phenomenon of early internationalizing firms: what do we know after a decade (1993–2003) of scientific inquiry? International Business Review, 14, 147–166.

Ritter, T. (1999) The Networking company. Antecedents for coping with relationships and networks effectively, Industrial Marketing Management, 28, 467–479.

Ritter, T., Wilkinson, I. F. and Johnston, W. J. (2002) Measuring network competence: some international evidence, Journal of Business & Industrial Marketing, 17, (2/3), 119-138.

Ritter, T. and Gemünden, H. G. (2003) Network competence: its impact on innovation success and its antecedents, Journal of Business Research, 56, 745–755.

Rocha, F. (1998) As atividades produtoras de software no Brasil, Texto para Discussão, Instituto de Pesquisa Econômica Aplicada – IPEA, Texto para Discussão no. 603, Available from: <http://www.ipea.gov.br/> (accessed 14th January 2008).

Roolah, T. (2002). Internationalisation of firms from small open transition economies: The intra-firm factors and inward-outward connections, Journal of East-West Business, 8, (3/4), 123-144.

Roselino, J. E. (2006a) A indústria de software: o “modelo brasileiro” em perspectiva comparada, doctoral thesis, Universidade Estadual de Campinas – UNICAMP, Instituto de Economia.

Roselino, J. E. (2006b) Análise da Indústria Brasileira de Software com Base em uma Taxonomia das Empresas: Subsídios para a Política Industrial, Revista Brasileira de Inovação, 5, (1), 157-201.

Rugman, A. and D’Cruz, J. (2001) The theory of the flagship firm In Cooperative Strategy. Economics, Business, and Organizational Issues, (eds. Faulkner, D. and De Rond, M.), Oxford University Press, Oxford, 57-73.

Ruzzier, M., Hisrich, R. D., and Antoncic, B. (2006) SME internationalization research: past, present, and future, Journal of Small Business and Enterprise Development, 13, (4), 476-497.

Sayer, A. (1992). Method in Social Science: A Realist Approach, 2nd. Ed. London: Routledge.

Sayer, A. (2000) Realism and Social Science, Sage, London.

Sawyer, S. (2000) Packaged software: implications of the differences from custom approaches to software development, European Journal of Information Systems, 9, 47-58.

Scandura, T. A. and Williams, E. A. (2000) Research methodology in management: current practices, trends, and implications for future research, The Academy of Management Journal, 43, (6), 1248-1264.

Schmid, S. and Schurig, A. (2003) The development of critical capabilities in foreign subsidiaries: disentangling the role of the subsidiary's business network, International Business Review, 12, 755-782.

Schmitz, H. (1999) Global competition and local cooperation: success and failure in The Sinos Valley, Brazil, World Development, 27, (9), 1627-1650.

Schütz, A. (1967). The Phenomenology of the social world. Cited in: Smith, M.J. (1998). Social Science in Question. London: Sage, 164 p.

Schwarz, N. and Oyserman, D. (2001) Asking questions about Behaviour: cognition, communication, and questionnaire construction, American Journal of Evaluation, 22, (2), 127-160.

Sebrae (2006) Onde estão as Micro e Pequenas Empresas no Brasil. Sebrae, Available from: http://www.sebraesp.com.br/conhecendo_mpe/mpe_numero/onde_mpe_brasil (accessed 14th January 2008).

Seleim, A., Ashour, A. and Bontis, N. (2007) Human capital and organisational performance: a study of Egyptian software companies, Management Decision, 45, (4), 789 - 801.

Sengenberger, W. and Pyke, F. (1992) Industrial districts and local economic regeneration: research and policy issues In Industrial districts and local economic regeneration, (eds. Pyke, F. and Sengenberger, W.), International Institute for Labour Studies, Geneva, 3-29.

Shaw, M., Bednallb, D. and Hallc, J. (2002) A Proposal for a Comprehensive Response-Rate Measure (CRRM) for Survey Research, Journal of Marketing Management, 18, 533-554.

Sherer, S. (2003) Critical success factors for manufacturing networks as perceived by network coordinators, Journal of Small Business Management, 41, (4), 325-345.

Shi, Y. (2001) Technological capabilities and international production strategy of firms: the case of foreign direct investment in China, Journal of World Business, 36, (2), 184-204.

Slangen, A. and Hennart, J-F. (2007) Greenfield or acquisition entry: A review of the empirical foreign establishment mode literature, Journal of International Management, 13, 403–429.

Smith, J. B. and Barclay, D. W. (1999) Selling partner relationships: The role of interdependence and relative influence, The Journal of Personal Selling & Sales Management, 19, (4), 21-40.

Smith, M. J. (1998) Social Science in Question, London: Sage.

Softex (2005) Perfil das Empresas Brasileiras Exportadoras de Software, Relatório de Pesquisa. Departamento de Política Científica e Tecnológica - DPCT/UNICAMP, Associação para Promoção da Excelência do Software Brasileiro – Softex.

Softex (2007) Sistema Softex. Relatório Anual 2007, 48 p., Available from: http://www.softex.br/portal/_asoftex/RelatoriosAnuais/Relatório%20Anual%202007.pdf (accessed 14th February 2009).

Softex (2009) Software e Serviços de TI: A Indústria Brasileira em Perspectiva. Observatório Softex, Número 1, Volume 1, Associação para Promoção da Excelência do Software Brasileiro – Softex, Campinas.

Solberg, C.A. and Durrieu, F. (2006) Access to Networks and Commitment to Internationalisation as Precursors to Marketing Strategies in International Markets, Management International Review, 46, (1), 57-83.

Sopas, L. (2000) “Born” exporting in regional clusters: preliminary empirical evidence. In 27th Annual Conference UK Chapter Academy of International Business: The Multinational in the Millennium: Companies and Countries, Changes and Choices (eds. Young, S. and Hood, N.), 3, 95-121.

Spekman, R. E. and Carraway, R. (2006) Making the transition to collaborative buyer–seller relationships: An emerging framework, Industrial Marketing Management, 35, 10– 19.

Spekman, R. E., Salmond, D. J. and Lambe, C. J. (1997) Consensus and collaboration: norm-regulated behaviour in industrial marketing relationships, European Journal of Marketing, 31, (11/12), 832-856.

Spence, M. and Crick, D. (2006) A comparative investigation into the internationalisation of Canadian and UK high-tech SMEs, International Marketing Review, 23, (5), 524-548.

Stahl, B. (2000) Buying abroad. The case of inward internationalisation processes, Working paper 2000/1, Department of Business Studies, Uppsala University.

Stefanuto, G. N. (2004) O programa Softex e a indústria de software no Brasil, doctoral thesis, UNICAMP, Instituto de Geociências.

Stevenson, H. H. (1983) A perspective on entrepreneurship, Harvard Business School Working Paper 9, 384-131.

Stevenson, H.H. and Jarillo, J. C. (1990) A paradigm of entrepreneurship: entrepreneurial management, Strategic Management Journal, 11, Special Issue: Corporate Entrepreneurship, 17-27.

Stiles, J. (2003) A philosophical justification for a realist approach to strategic alliance research, Qualitative Market Research: An International Journal, 6, (4), 263-271.

Subramaniam, M. and Watson, S. (2006) How interdependence affects subsidiary performance, Journal of Business Research, 59, 916-924.

Sullivan, D. (1994) Measuring the Degree of Internationalization of a Firm, Journal of International Business Studies, 25, (2), 325-342.

Svensson, G. (2004) Triadic trust in business networks: a conceptual model and empirical illustration, European Business Review, 16, (2), 165-190.

Svensson, G. (2002) The measurement and evaluation of mutual dependence in specific dyadic business relationships, Journal of Business and Industrial Marketing, 17, (1), 56-74.

Teece, D. J., Pisano, G. and Shuen, A. (1997) Dynamic capabilities and strategic management, Strategic Management Journal, 18, (7), 509-533.

The Economist Intelligence Unit (2008) How technology sectors grow: benchmarking IT industry competitiveness 2008 [online], Available from: <http://global.bsa.org/2008eiu/index.html> (Accessed 1st March 2009).

Thomas, S. J. (2004) Using web and paper questionnaires for data-based decision making: from design to interpretation of the results, Corwin Press.

Tigre, P.B., Botelho, A.J., Dedrick, J., and Kraemer, K.L. (2001) Brazil meets the global challenge: I.T. Policy in a post-liberalization environment. Special issue of The Information Society on "The Impacts of Economic Liberalization on IT Production and Use", 17 (2), 91–104.

Tjosvold, D. and Weicker, D. (1993) Cooperative and competitive networking by entrepreneurs: a critical incident study, Journal of Small Business Management, 31, (1), 11–21.

Tsai, M-T. and Cheng, Y-M. (2004) Asset specificity, culture, experience, firm size and entry mode strategy: Taiwanese manufacturing in China, South-East Asia and Western Europe, International Journal of Commerce & Management, 14, (3/4), 1-27.

Tseng, C-H, Tansuhaj, P., Hallagan, W. and McCullough, J. (2007) Effects of firm resources on growth in multinationality, Journal of International Business Studies, 38, 961-974.

Tucci, A. (2005) Trade, foreign networks and performance: a firm-level analysis for India, Development Working Papers No. 199 (Centro Studi Luca d'Agliano, University of Milan).

UNCTAD (2002) Changing dynamics of global computer software and services industry: implications for developing countries, Technology for Development Series, United Nations, New York and Geneva.

UNCTAD (2005) World Investment Report 2005: Transnational Corporations and the Internationalization of R&D, United Nations, New York and Geneva.

UNCTAD (2006) World Investment Report 2006: FDI from Developing and Transition Economies: Implications for Development, United Nations, New York and Geneva.

UNCTAD (2010) World Investment Report 2010: Investing in a Low-Carbon Economy, United Nations, New York and Geneva.

Uzzi, B. (1997) Social structure and competition in interfirm networks: the paradox of embeddedness, Administrative Science Quarterly, 42, 35-67.

Veloso, F., Botelho, A. J. J., Tschang, T., and Amsden, A. (2003) Slicing the knowledge-based economy in Brazil, China and India: a tale of 3 software industries, Massachusetts Institute of Technology.

Veludo, M. L., Macbeth, D.K., and Purchase, S. (2004) Partnering and relationships within an international network context, International Marketing Review, 21, (2), 142-157.

Vissak, T. and Roolaht, T. (2003) The impact of networks on the internationalization process of Estonian firms, Paper presented at the 19th Industrial Marketing and Purchasing (IMP) International Seminar in Lugano, Switzerland, Available from: http://www.impgroup.org/paper_view.php?viewPaper=4440/ (accessed 18th May 2008).

Vissak, T. (2004) The importance and limitations of the network approach to internationalization, Paper presented at the 20th IMP-conference in Copenhagen, Denmark, Available from: http://www.impgroup.org/paper_view.php?viewPaper=4607 (accessed 12th August 2006).

Wakelin, K. (1998) Innovation and export behaviour at the firm level, Research Policy, 26, 829–841.

Weaver, K.M. and Dickson, P.H. (1998) Outcome quality of small- to medium-sized enterprise-based alliances: the role of perceived partner behaviours, Journal of Business Venturing, 13 (6), 505–522.

Weerawardena, J., Mort, G.S., Lieasch, P.W. and Knight, G. (2007) Conceptualizing accelerated internationalization in the born global firm: a dynamic capabilities perspective, Journal of World Business, 42, 294-306.

Welch, L.S. (1992) The use of alliances by small firms in achieving internationalisation, Scandinavian International Business Review, 1, (2), 21–37.

Welch, L. S. and Luostarinen, R. (1994) Internationalization: evolution of a concept In The Internationalization of the Firm, (eds. Buckley, P. J. and Ghauri, P. N.), Dryden Press, London, 155-171.

Welch, D. E., Welch, L., Wilkinson, I. F. and Young, L. C. (1996) Network analysis of a new export grouping scheme: the role of economic and non-economic relations, International Journal of Marketing Research, 13, 463-477.

Welch, D. E., Young, L. C. and Wilkinson, I. F. (1998) The importance of networks in export promotion: policy issues, Journal of International Marketing, 6, (4), 66-82.

- Wen, C. and Yeh, W. (2010) Positioning of international air passenger carriers using multidimensional scaling and correspondence analysis, Transportation Journal, Wntr, 7-23.
- Westhead, P., Wright, M. and Ucbasaran, D. (2001) The internationalization of new and small firms: a resource-based view, Journal of Business Venturing, 16, (4), 333-358.
- Whitelock, J. and Jobber, D. (2004) An evaluation of external factors in the decision of UK industrial firms to enter a new non-domestic market: an exploratory study, European Journal of Marketing, 38, (11/12), 1437-1455.
- Williamson, O. E. (1975) Markets, hierarchies: analysis, antitrust implications. Free Press: New York.
- Williamson, O. E. (1991) Comparative economic organization: the analysis of discrete structural alternative, Administrative Science Quarterly, 36, 269-296.
- Wilson, J. B. and Natale, S. M. (2001) "Quantitative" and "qualitative" research: an analysis, International Journal of Value-Based Management, 14, (1), 1-10.
- World Bank (2008) World Development Indicators Database [online], Available from: http://siteresources.worldbank.org/DATASTATISTICS/Resources/WDI08_section1_intro.pdf/ (accessed 15 January 2009).
- Wright, M., Filatotchev, I., Buck, T. and Bishop, K. (2002) Foreign partners in the former Soviet Union, Journal of World Business, 37, 165-179.
- Yang, C-H., Chen, J-R., and Chuang, W-B. (2004) Technology and Export Decision, Small Business Economics, 22, (5), 349-364.
- Yang, D. and Sonmez, M. (2007) Economic and cultural impact on intellectual property violations: a study of software piracy, Journal of World Trade, 41, (4), 731-750.
- Yiu, D., Lau, C., and Bruton, G. D. (2007) International venturing by emerging economy firms: the effects of firm capabilities, home country networks, and corporate entrepreneurship, Journal of International Business Studies, 38, (4), 519-540.
- Young, S., Hood, N. and Lu, T. (1998) International development by Chinese enterprises: key issues for the future, Long Range Planning, 31, (6), 886-893.
- Zahra, S. A. (2005) A theory of international new ventures: a decade of research, Journal of International Business Studies, 36, 20-28.
- Zahra, S., Ireland, R. and Hitt, M. (2000) International expansion by new venture firms: international diversity, mode of market entry, technological learning, and performance, Academy of Management Journal, 43, (5), 925-950.
- Zhao, H., Luo, Y. and Suh, T. (2004) Transaction cost determinants and ownership-based entry mode choice: a meta-analytical review, Journal of International Business Studies, 35, 524-544.

Zhou, L. (2007) The effects of entrepreneurial proclivity and foreign market knowledge on early internationalization, Journal of World Business, 42, 281–293.

Zhu, H., Hitt, M.A. and Tihanyi, L. (2006) The internationalization of SMEs in emerging economies: institutional embeddedness and absorptive capacities, Journal of Small Business Strategy, 17, (2), 1-26.

Zikmund, W. G. (1997) Business Research Methods, the Dryden Press: Sydney.

Zou, S. and Stan, S. (1998) The determinants of export performance: a review of the empirical literature between 1987 and 1997, International Marketing Review, 15, (5), 333-356.

Zucchella, A., Palamara, G. and Denicolai, S. (2007) The drivers of the early internationalization of the firm, Journal of World Business, 42, 268–280.

Zuckerman, E. W. (2003) On networks and markets by Rauch and Casella, eds. Journal of Economic Literature, 41, (2), 545-565.

Appendix B: Cover Letter (English Language Version)

Networks, Collaboration and the Internationalization of Brazilian Businesses

A Research Study of Brazil's
Software and Allied Services
Industry

Support:



Brasília, November 2005.

Dear Executive,

It is with pleasure I would like to invite you to take part in the research project "Networks, Collaboration and The Internationalization of Brazilian Businesses. A Research Study of Brazil's Software and Allied Services Industry."

By answering to the project's questionnaire your company will benefit from receiving first hand information which can help you in your internationalization strategies, one of the elements of great relevance for companies wishing to enter new markets.

As a thank-you for completing and returning the questionnaire until 16th December 2005, you have an opportunity to win an annual subscription of Harvard Business Review in Portuguese. The winner will be determined by a random draw from all eligible entries, to be held on 17th December 2005, according to the four numbers of the 1st. Prize of the Federal Lottery. As soon as you return the completed questionnaire you will be notified by e-mail of your random number.

Your participation will be greatly appreciated! Please complete the enclosed questionnaire and send it back in the pre-paid envelope provided.

A link to the questionnaire and further information are available on the home page of this project. Have a look at: <http://www.sebrae.com.br/br/pesquisasw/index.asp>

If you have any comments or queries, please email the researcher at: pesquisasw@sebrae.com.br.

The researcher guarantees that all responses will be treated in confidence.

The full results of this survey will form the basis for my doctoral thesis which I am currently undertaking at The University of Bradford School of Management, in the UK. Therefore, your co-operation will be of great importance for research progress in this area.

I look forward to your support!

A handwritten signature in blue ink, appearing to read "Raissa Rossiter".

Raissa Rossiter
Researcher

Appendix C: Survey Instrument (English Language Version)

Networks, Collaboration and the Internationalization of Brazilian Businesses

A RESEARCH STUDY OF BRAZIL'S SOFTWARE AND ALLIED SERVICES INDUSTRY

QUESTIONNAIRE 2005

Information About the Research:

This research investigates the impact of collaboration strategies and of business networks on the internationalization of Brazil's software and allied services industry, by means of a comparative study of micro, small and medium-sized enterprises (SMEs), on the one hand, and companies of greater size on the other.

This questionnaire should be completed by the owner of the company or by an executive who is directly involved in strategic decision-making.

We appreciate how busy you are, but we would be very grateful if you could set aside some of your valuable time to respond to the questionnaire.

It is very important that no response space should be left blank, as this would prejudice the analysis of the data.

All responses will be treated in confidence. Total anonymity will be guaranteed, and company-specific data will not be divulged to the public.

If you would like further information on the theme of this research and about the researcher or to download the questionnaire, please visit <http://www.sebrae.com.br/br/pesquisasw/index.asp>

Your contribution is essential to the success of this work.

How to Participate:

Please return the completed questionnaire in the pre-paid envelope provided.



Researcher: Raissa Rossiter

This study is being carried out with the support of the Brazilian Support Service for Micro and Small Enterprises (SEBRAE), the University of Bradford School of Management in the United Kingdom, and with the help of the Society for the Promotion of Excellence in Brazilian Software – SOFTEX.

A. About Your Company:

1. Indicate the categories or category below which describe(s) most precisely your firm's principal area(s) of activity. Mark (X) all the options you consider appropriate.

- ☐ Outsourcing (of personnel, equipment, systems, etc)
☐ Bespoke software
☐ Customized software
☐ Packaged software
☐ Embedded software
☐ Other (please specify)
☐ My firm neither develops nor distributes software (In the event that you choose this answer, please complete the details on page 8 and return the questionnaire in the pre-paid envelope provided.)

2. In terms of sales volumes, indicate the main services offered and/or products developed by your company for specific business sectors. Choose (X) a maximum of 5 options.

Sector	Packaged Software	Bespoke Software	Customized Software	Embedded Software
Agriculture/ Agro-business				
Warehousing/ Retail and distribution				
Banking				
Education				
Energy				
Engineering, Architecture and Civil Construction				
Software engineering				
Government				
Manufacturing				
Multi-media/ Entertainment				
Health				
Security				
Services				
Telecommunications				
Transport				
Tourism and Hospitality				
Others (please specify):				

3. When did your business start?
.....(Year).

4. What is the total number of employees of your business?.....

5. Which items below best describe your firm? Mark (X) all the options you consider appropriate.

- ☐ Independently owned and operated
☐ Wholly-owned subsidiary of a national holding company
☐ Wholly-owned subsidiary of a foreign holding company
☐ Partially-owned subsidiary of a national holding company

- ☐ Joint venture between local companies
☐ Joint venture including at least one foreign company (if this is the case, size of foreign participation..... %).
☐ Other (please specify)

6. If your company is a subsidiary of a foreign holding company, indicate the country where that company is headquartered.
.....

7. Is your company a member of any of these sectoral associations? Mark (X) all the options you consider appropriate.

- ☐ ABES
☐ Abranet
☐ Assespro (any region)
☐ Softex (any nucleus)
☐ Other: Which?.....
☐ None

B. Strategy, Internationalization and Collaboration

1. Has your business acquired foreign machinery, equipment, software, or any other type of foreign input in the last three years? (2003, 2004 and 2005)

From a local supplier?

- ☐ Yes ☐ No

From a foreign supplier?

- ☐ Yes ☐ No

2. In terms of value, what was the proportion of foreign goods or inputs acquired by your company in the last three years?

2003..... % 2004..... % 2005..... %
(Estimate)

3. Has your company exported in the last three years (2003, 2004 and 2005)?

- ☐ Yes ☐ No

If no, had your company exported prior to the last three years?

- ☐ Yes. In which year was your first export?
(Year)
☐ No (go to section C)

4. What percentage of your company's sales were made in foreign markets in the last three years?

2003..... %
 2004..... %
 2005..... % (Estimate)

5. When did your firm achieve its first international sale?
.....(Year).

6. Does your firm possess any of the following modalities of representation in other countries?

Subsidiaries:

- ☐ Yes ☐ No

Affiliates:

- ☐ Yes ☐ No

Joint ventures:

- ☐ Yes ☐ No

7. Show below, on a scale of 1 to 5, how often your business uses the following marketing channels for sales in foreign markets.

Marketing channels	1 Never	2 Rarely	3 Occasionally	4 Frequently	5 Very Frequently
Sales Agents/ Reps in Brazil					
Sales Agents/ Reps abroad					
Direct E-commerce to consumers – B2C					
Direct E-commerce to businesses – B2B					
Direct export to customers					
Distributors in foreign markets					
Company's own sales offices abroad					
Holding company					
Joint ventures					
Alliances and/or consortia					
Other: Please specify:					

8. To/ in how many countries does your company currently export/ operate?Countries.

9. How would you characterize your firm's performance in foreign markets in the last three years (2003, 2004 and 2005)? Mark (X) the appropriate number:

Significant decline 1 2 3 4 5 Significant increase

10. On a scale of 1 to 5, how often does your firm sell to the following markets/regions? Mark (X) the appropriate number for each market/region.

Region/Market	1 Never	2 Rarely	3 Occasionally	4 Frequently	5 Very Frequently
South America					
Mexico and Central America					
Caribbean					
USA and Canada					
Eastern Europe					
European Union					
CPLP ¹					
Middle East and Africa					
Australia and N. Zealand					
Asia-Pacific ¹ and South Asia ¹					
China					
Japan					

11. Does your company have a specific department for import/export matters?

☐ Yes ☐ No

12. On a scale of 1 to 5, to what extent does your company conduct formal market planning to evaluate international markets? Mark (X) the appropriate number:

Little or almost none 1 2 3 4 5 Significant and detailed

13. On a scale of 1 to 5, to what extent do the external factors listed below represent constraints on the development of your company's international operations? Mark (X) the appropriate number for each factor:

Factors	1 No Limitation	2 Small	3 Medium	4 Medium- high	5 High limitation
Availability of qualified personnel where the business is located					
Availability of financing at affordable rates					
Excessive bureaucracy					
Economic conditions in the foreign markets					
Physical and commercial infrastructure, e.g. telecommunications, transport					
Taxation					
Quality certificates					
International agreements					
Lack of national export policy					
Cultural differences					
Lack of image for Brazilian software internationally					
Government policy in export assistance					
Advisory services offered by government					
Lack of access to information about international markets					
Competition in international markets					
Import tariffs/barriers in international markets					
Other: Please specify:					

14. On a scale of 1 to 5, indicate to what extent your company has actually developed collaborative arrangements² in the last three years (2003, 2004 and 2005), with the types of partners listed below, for access to international markets? Mark (X) the appropriate number for each type of partner:

Types of partner	Origin of partner	1 Not at all	2 Low	3 Medium	4 High	5 To a great extent
Customers	Domestic					
	Foreign					
Suppliers	Domestic					
	Foreign					
IT companies	Domestic					
	Foreign					
Universities	Domestic					
	Foreign					
Business-support agencies	Domestic					
	Foreign					
Research and technology institutes	Domestic					
	Foreign					
Federal government						
Local govt (state/municipal)						
International organizations						
Business associations in Brazil						
Foreign governments e.g. embassies, consulates						
Other: Please specify	Domestic					
	Foreign					

¹ CPLP = Community of Portuguese-Speaking Countries = Brazil, Portugal, East Timor, Angola, Cape Verde, Guinea-Bissau, Mozambique, São Tomé & Príncipe ² Asia-Pacific = Hong Kong, Indonesia, Malaysia, Vietnam, Singapore, South Korea, Taiwan, Thailand, Philippines ³ South Asia = India, Sri Lanka, Pakistan, Bangladesh, Afghanistan

* In the context of this study, collaborative arrangements are joint activities carried out with partners or independent companies which unite their forces in a process of generating value

15. In the last three years (2003, 2004 and 2005), has your business collaborated with micro, small or medium firms in the software and allied services sector for the purposes of your operations in the international market?

☐ Yes. If yes, to what extent, on a scale of 1 to 5, can these collaborative activities be justified by the reasons below?

Mark (X) the appropriate number:

Reasons	1 Not at all	2 Low	3 Medium	4 High	5 To a great extent
Access to new and bigger markets					
Diversification of products and services					
Access to know-how and technology					
Additional production capacity for your business					
Cost reductions					
Access to labour					
Access to financing					
Other Please specify:					

☐ No. If no, please go to Section C

16. On a scale of 1 to 5, during the last three years (2003, 2004 and 2005) how often has your business been involved in the types of collaboration below with micro, small or medium enterprises for the purposes of your operations in the international market?

Mark (X) the appropriate number for each item.

Types of collaboration	SMEs	1 Never	2 Rarely	3 Occasionally	4 Frequently	5 Very Frequently
Only informal collaboration	Brazilian Foreign					
Formal and informal collaboration	Brazilian Foreign					
Only formal collaboration	Brazilian Foreign					

C. About Participation in Business Networks

1. In the last three years (2003, 2004 and 2005) has your company participated in any business network?³

☐ Yes ☐ No. If no, please go to Section D

2. Does your company still remain involved in the activities of this collaborative network?

☐ Yes ☐ No. If no, please go to Section D

If your answer was 'No', explain briefly why

If your answer was 'Yes', answer the rest of this section, having in mind the most important business network that your company is participating in currently.

3. What is the basis of the collaborative relationships in this specific network of businesses? Mark (X) all the options you consider appropriate.

³In the context of this study, the term business networks means an intentionally created and organized collaboration between two or more actors (firms or institutions) which goes beyond a specific task, with the purpose of achieving a common objective.

- ☐ A written document, e.g. contract, agreement, between the parties
- ☐ A verbal agreement between the parties
- ☐ The companies are members of a business or sectoral association
- ☐ A special company established by network partners to carry out collaborative activities
- ☐ A network initiative established by government or by a support agency, of which the companies form a part
- ☐ Other. Please specify

4. For how long has this business network existed?

.....Years/.....Months.

5. On a scale of 1 to 5, to what extent are the relations between the partners in this specific network based on the following factors? Mark (X) the number appropriate to each item.

Factors	1 not at all	2 Low	3 Medium	4 High	5 to a great extent
Access to resources of partner (e.g. reputation, knowledge, equipment, personnel)					
Complementarity of technical and business activities					
Need for synchronised response of both partners in mutual business activities					
Personal relationships					
Written agreements					
Other Please specify:					

6. With what types of organizations are such collaborative network activities carried out? Mark (X) all the options you consider appropriate.

- ☐ Companies in the software and allied services sector
- ☐ Companies from other sectors
- ☐ Universities
- ☐ Professional or commercial associations
- ☐ Business support agencies
- ☐ Research and technology institutes
- ☐ Local government (state or municipal)
- ☐ Federal government
- ☐ Others. Please specify

7. Are there other companies from the software and allied services sector participating in this business network?

☐ Yes ☐ No

If your answer is 'Yes', mark all the options below about these other companies which you consider appropriate in comparison with your own company.

		Yes	No	Not Applicable
Type of product or service	Similar			
	Complementary			
	Other Please specify:			
Types of sectors	Similar			
	Complementary			
	Different			
	Other Please specify			

8. On a scale of 1 to 5, to what extent has your company utilized the channels mentioned below to initiate the development of the network relationships referred to previously? Mark (X) the appropriate number for each type of channel.

Type of channel	1 not at all	2 Low	3 Medium	4 High	5 to a great extent
Business fairs					
Conferences					
Academic contacts					
Governmental initiatives					
Trading companies					
Individuals					
Others: Please specify:					

9. How often does your company maintain contacts with other partners for the development of activities in this specific business network?

Mark (X) only one option.

- ☐ Several times per week
☐ Once a week
☐ Once a month
☐ Once in six months
☐ Once a year

10. Approximately how many organizations, both public and private, participate in this same network of companies?

Number of partners in the network

Private partners

Publicpartners

11. In relation to the geographical location of your company, what is the location of the majority of the organizations with which, in the last three years (2003, 2004 and 2005), your company has been involved and carried out network activities?

Mark (X) only one option

- ☐ Same city
☐ Same State
☐ Same Region (North, North-East, Centre-West, South East, South)
☐ Spread around other States
☐ Abroad
☐ Other: Please specify

12. On a scale of 1 to 5, indicate to what extent you agree or disagree with the importance of the following factors as being critical for your network to reach successful results. Mark (X) the appropriate number for each factor:

Factors	1 Disagree completely	2 Low	3 Medium	4 High	5 Agree completely
Reliability of partners					
Similarity of business values of partners					
Willingness of partners to share internal information					
Willingness of partners to share sensitive data (e.g. cost structures)					

Factors	1 Disagree completely	2 Low	3 Medium	4 High	5 Agree completely
The belief among the participants that the others will not try to go back on their commitments					
The belief among the participants that one will not try to take advantage of the others					
Perception of fairness in joint negotiations					
Significant involvement of entrepreneurs in network activities					
Significant involvement of functionaries of the companies participating in the network					
Continuous availability of financing					
Availability of resources of participating companies					
Willingness of participants to make internal changes to adapt themselves to the goals of the network					
Desire of participants to improve their competitive position					
Desire of the participants to innovate					
Skills diversity of participants					
Success of participants independently of the network					
Profound knowledge of the values and skills of participants on the part of the others					
Criteria for identifying and selecting participants					
Explicit procedures for monitoring the performance of participants					
Previous business experience of the participants with each other					
Significant personal relationships amongst the participants					
Previous experience with intermediary or independent agent					
Existence of an intermediary or independent agent					
Customer acceptance of the network					
Geographical proximity of the participants					
Macroeconomic conditions					
Other: Please specify:					

13. On a scale of 1 to 5, what is the current importance of the reasons below for your company seeking and maintaining collaborative relationships with the organizations in this business network? Mark (X) the appropriate number for each factor:

Reasons	1 Not important	2 Low	3 Medium	4 High	5 Very important
Lack of opportunity for domestic growth					
Greater access to financing					
Greater access to technology					
Increased competition in the domestic market					
Access to qualified labour					
Diversification of risk and volatility					
Access to management techniques					
Lower production costs					
Opportunities for growth in major markets					
Overcoming protectionist restrictions					
Technical advantages or advantages of product leadership					
Information about opportunities					
Comprehensive planning and market research					
Saw the opportunity and will not let it escape					
Other: Please specify:					

14. In your opinion, on a scale of 1 to 5, has participation in this specific network of companies contributed to the competitiveness of your company?

Mark (X) the appropriate number

1 Not at all	2 Low	3 Medium	4 High	5 To a great extent

Feel free to add other comments :

D. Context, Structure and Performance of the Company

1. On a scale of 1 to 5, indicate the manner in which your business carries out the activities and tasks listed below. Mark (X) the appropriate number for each statement.

Activities	1 Never do this	2	3	4	5 in a very careful and detailed way
We evaluate how our relationship with one business partner may depend on our relationship with other partners					
We evaluate how our relationship with one business partner may affect our relationship with other partners					
We organize regular meetings among our company personnel involved in relationships with our business partners, and with the partners themselves					
We assign people for each relationship with our business partners					
We assign responsibility to individuals for each relationship with our business partners					
We use other organizations, apart from our current business partners, to identify potential business partners (e.g. consultants, sectoral associations, governmental organizations)					
We visit exhibitions and fairs to identify potential business partners					
We research specialized magazines to identify potential business partners					
We discuss forms of collaboration with the personnel of our business partners					
We promote contacts between our business partners and the key people in our company					
We promote contacts between the personnel of our company and our business partners' key people					

2. On a scale of 1 to 5, indicate to what extent you agree or disagree with the statements below describing the various attributes of the personnel in your company who are involved in contact with your company's business partners. Mark (X) the appropriate number for each statement.

Statements	1 Disagree completely	2 Disagree	3 No opinion	4 Agree	5 Agree completely
They have a good relationship with important people in our company					

*Research and Development in the context of this study refers to a set of systematic activities which involve the generation of knowledge and the adaptation of already existing technologies in the form of finished products and processes, including the realization of technological or scientific advances.

Statements	1 Disagree completely	2 Disagree	3 No opinion	4 Agree	5 Agree completely
They have a good knowledge of how the company works					
They have a good knowledge of the functioning of the company of our business partner					
They have experience in dealing with business partners					
They are good at communicating their needs to others					
They negotiate confidently					
They interact well with other people					
They easily sense potential conflict					
They are good at finding solutions when there is a conflict					

3. What percentage of your workforce has each of the following levels of education?

Level of education	Percentage of workforce who have achieved this as their highest level
No formal education	%
Primary/ elementary	%
Secondary	%
Undergraduate degree	%
Postgraduate degree:	%
Diploma, Masters, Doctorate	
Total	100%

4. Indicate the quality certifications your company possesses, marking (X) all the items you consider appropriate.

- ☐ None
☐ ISO 9001
☐ CMM (Capability Maturity Model)
 What level?
☐ CMMI (Capability Maturity Model Integration)
 What level?
☐ Other: Please specify.....

5. What was the gross volume of your company's sales (in R\$) in 2004? Please mark (X) the appropriate range.

- ☐ Below R\$ 240.000,00
☐ R\$ 240.000,01 - R\$ 1.000.000,00
☐ R\$ 1.000.000,01 - R\$ 2.000.000,00
☐ R\$ 2.000.000,01 - R\$ 5.000.000,00
☐ R\$ 5.000.000,01 - R\$ 10.000.000,00
☐ R\$ 10.000.000,01 - R\$ 20.000.000,00
☐ R\$ 20.000.000,01 - R\$ 50.000.000,00
☐ Above R\$ 50.000.000,00

6. What proportion of the total sales volume of the company was invested in Research and Development⁴ in the last three years? 2003.....% 2004.....% 2005.....% (Estimate)

7. Does your company hold any patent?

- In Brazil
☐ Yes ☐ No
 Abroad
☐ Yes ☐ No

8. On a scale of 1 to 5, what is the importance of the factors below as obstacles to attempts by your company to do business abroad? Mark (X) the appropriate number for each factor.

Factors	1 Makes no difference	2 Low	3 Medium	4 Important	5 Very important
Lack of command of other languages					
Lack of knowledge of foreign laws, norms, customs					
Lack of subsidiaries/ affiliates outside Brazil					
Lack of collaboration agreements with foreign firms					
Lack of experience abroad					
Lack of specific competence/ knowledge in relation to procedures					

9. In your opinion, what is the principal market (in sales volume) for your main product or group of services? Mark (X) only one option below

- ☐ Local (your city/ your state)
☐ Regional
☐ National
☐ International

10. Your main competitors operate in what context? Mark (X) all the options you consider appropriate.

- ☐ Local (your city / your state)
☐ Regional
☐ National
☐ International

E.

Mechanisms of Access, Co-ordination and Governance

1. On a scale of 1 to 5, to what extent do you agree or disagree with the following statements? Mark (X) the appropriate number for each statement.

Statements	1 Disagree completely	2	3	4	5 Agree completely	Not applicable
The company uses problem-resolution mechanisms to co-ordinate interactions and solve problems with business partners						
The company makes use of negotiation routines and mutual adjustments with its business partners						
The company makes use of structured mechanisms of communication and detailed monitoring to co-ordinate interactions and to find solutions for problems with its working partners						
In the city and state where the company is located there is a support structure (incubation services for businesses and professionals, financial support, etc.) accessible to businesses and entrepreneurs in the software and allied services sector						
In the locality or region where the firm operates there are broader networks (technological, institutional, etc.)						

Statements	1 Disagree completely	2	3	4	5 Agree completely	Not applicable
The company has easy access to broader established networks such as institutional, technological and political networks						
In my city/state there are effective initiatives by business support agencies or governmental agencies directed specifically to provide assistance to businesses and entrepreneurs in the software and allied services sector						
The company is involved in constant interaction with the various levels of governmental and regulatory agencies and with political representatives in this city and state, essential for the acquisition of external resources						
The main network in which the company participates was established under formal terms of collaboration						
The main business network in which the company participates is managed on the basis of detailed planning, establishment of goals, and a budgetary system which allows its objectives to be reached						
The main business network in which the company participates has established mechanisms for regular communication and operational links, which allow interpersonal links and collaborative norms to be developed						
In the main network in which the company participates, its partners make quick decisions and process complex information						
The main network in which the company participates is characterized by informal social systems in place of bureaucratic structures and formal contractual relationships						
There is a balance of power between the partners in the main business network to which the company belongs						
The great majority of organizations with which the company is involved in its main business network are located in the same city as the company						

F.

International Entrepreneurial Orientation and the Management of the Company

1. Mark (X) the number which best characterizes your company in relation to each of the following statements.

Statement	1 Doesn't happen like this	2	3	4	5 Applies perfectly
In dealing with competition my company is generally the first to present new products and services, administrative and operational techniques, technology etc.					
The top management of my company has a strong tendency to take on high-risk projects (with chances of very high returns)					
The top management of my company believes that, depending on the nature of the environment, broad and courageous attitudes are necessary to achieve the company's objectives					
Faced with situations in which it is necessary to take decisions which involve uncertainties, my business generally adopts an aggressive posture to maximize the probability of exploiting potential opportunities					

Statement	1 Doesn't happen like this	2	3	4	5 Applies perfectly
My company is in favour of a strong emphasis on research and development, leadership and technological innovation					
My company has a high proportion of products which consumers consider superior to the competition					
The development of innovative techniques of marketing is important to the company's strategy					
Utilizing qualified sales forces / sales agents is important for my company's strategy					
In the last three years we have improved significantly the effectiveness of our marketing functions, such as sales, distribution and advertising					
In defining our business strategies we focus on spotting opportunities					
We don't let resources, whether available or not, represent a limitation for us					
Our fundamental task is to take advantage of opportunities which we consider valid, and afterwards find a way of acquiring resources to exploit them					
Opportunities are what control our business strategies					
What we need from our resources is the capacity to utilize them					
We prefer to have total control and to be owners of the resources we use					
We usually use third-party or hired resources					
We prefer to use only our own resources in our undertakings					
The company as a whole has the idea that growth is our principal objective					
Growth isn't necessarily our main objective. The life of the company in the long term is at least as important					
The company as a whole has the idea that our intention is to grow to the maximum and as fast as possible					
Before initiating the process of international sales of our products, we seek detailed information about the conditions and the market demand or the level of competition in one or more foreign countries					
Prior to beginning the process of international sales of our products we commit significant financial and human resources to these operations					
Prior to initiating the process of international sales of our products we modify significantly our products or services to match the requirements of foreign markets					

4. What is your level of education? Mark (X) only one option below.

- ☐ No formal education
☐ Primary education
☐ Secondary education
☐ Undergraduate degree
☐ Postgraduate degree. Please specify.....

5. How many years experience do you have in the software and allied services sector?.....Years.

6. In how many languages, apart from Portuguese, do you have the ability to conduct business? Mark (X) only one option.

- ☐ None
☐ 1
☐ 2
☐ 3
☐ 4 or more.

7. Would you be available to continue contributing to this project by means of a follow-up interview so that the interviewer could understand more fully the position of your business?

- ☐ Yes ☐ No

Please supply the following data:

Your name:.....

Position:.....

E-mail:.....

Name of the company:.....

CNPJ:.....

Address:.....

City:.....State:.....

CEP:.....Telephone:.....

Company website:.....

Date of completion of this questionnaire:...../...../2005

Thank you for responding to this questionnaire!

Your help will be very useful.

Please send the questionnaire to the address on the pre-paid envelope.

Feel free to add whatever comments you have about the topics treated in this questionnaire or about the questionnaire itself in the space below:

G. Information About the Respondent

1. Gender:

- ☐ Feminine
☐ Masculine

2. Nationality:.....

3. How old are you? Mark (X) only one option below.

- ☐ Up to 21 ☐ 41-50
☐ 22 - 30 ☐ 51-60
☐ 31 - 40 ☐ Over 60

Appendix D: Cover Letter (Portuguese Language Version)

Redes, Colaboração e a Internacionalização de Empresas Brasileiras

Uma Pesquisa sobre a
Indústria de Software e
Serviços Correlatos
no Brasil

Apoio:



Brasília, Novembro de 2005

Prezado (a) Executivo (a),

Tenho a satisfação de lhe convidar para participar da pesquisa "Redes, Colaboração e a Internacionalização de Empresas Brasileiras", voltada à indústria de software e serviços correlatos no Brasil.

Respondendo ao questionário anexo sua empresa terá como principal benefício receber informações, em primeira mão, que lhe ajudarão em estratégias de internacionalização, um dos elementos de grande relevância para empresas nos seus processos de atingindo novos mercados.

Como forma de expressar agradecimento a todos que devolverem o questionário preenchido até 16 de dezembro, será sorteadas uma (01) assinatura de 1 ano da Harvard Business Review em Português. O sorteio ocorrerá no dia 17/12/2005, com base nos quatro últimos algarismos do 1º. Prêmio da Loteria Federal. Você receberá seu número para o sorteio via e-mail tão logo o questionário seja recebido.

Participe! Você deverá preencher o questionário e devolvê-lo utilizando o envelope-resposta pré-pago anexo.

Terei muita satisfação em receber sua visita à homepage que mantenho no endereço <http://www.sebrae.com.br/br/pesquisasw/index.asp>. Em caso de dúvida, fale com a pesquisadora através do e-mail pesquisasw@sebrae.com.br.

A pesquisadora garante que todos os dados terão tratamento confidencial.

Os resultados completos deste estudo irão formar a base para tese de doutorado que estou desenvolvendo junto à University of Bradford School of Management, na Inglaterra. Portanto, sua colaboração é de grande importância para o progresso da pesquisa nesta área.

Conto com seu apoio!

Raissa Rossiter
Pesquisadora

Redes, Colaboração e a Internacionalização de Empresas Brasileiras

Uma Pesquisa sobre a Indústria de
Software e Serviços Correlatos no Brasil

QUESTIONÁRIO 2005

Informações sobre a Pesquisa:

Esta pesquisa investiga o impacto das estratégias de colaboração e das redes de empresas na internacionalização da indústria de software e serviços correlatos no Brasil, por meio de um estudo comparativo entre as micro, pequenas e médias empresas (MPMEs) brasileiras e as empresas de maior porte do setor.

Este questionário deverá ser preenchido pelo empresário/proprietário da empresa ou por um executivo que esteja diretamente envolvido na tomada de decisões estratégicas.

Sabemos do volume de trabalho sob sua responsabilidade, mas agradeceríamos muito se pudesse reservar uma parte de seu precioso tempo para respondê-lo.

É muito importante que nenhuma resposta fique em branco, pois isso prejudicaria a análise dos dados.

Todas as respostas serão tratadas confidencialmente. Será garantido total anonimato e os dados de cada empresa não serão divulgados individualmente ao público.

Para obter mais informações sobre a temática da pesquisa e sobre a pesquisadora, ou se quiser fazer download do questionário, acesse o endereço:
<http://www.sebrae.com.br/br/pesquisasw/index.asp>

Sua contribuição é essencial para o êxito deste trabalho!

Como participar:

I. Devolvendo, no envelope pré-pago fornecido, o questionário preenchido.



Pesquisadora: Raissa Rossiter

Este estudo está sendo realizado com o apoio do Serviço Brasileiro de Apoio às Micro e Pequenas Empresas - Sebrae, da University of Bradford School of Management - Escola de Gestão da Universidade de Bradford no Reino Unido, e com a ajuda da Sociedade para Promoção da Excelência do Software Brasileiro - SOFTEX.

A. Sobre sua Empresa

1. Indique que categoria abaixo descreve de forma mais precisa sua principal área de atuação. Marque (X) todas as alternativas que julgar apropriadas.

- ☐ Outsourcing (de equipes, de sistemas, etc.)
☐ Software Sob Encomenda
☐ Software Customizado (custom software)
☐ Software Pacote (packaged software)
☐ Software Embarcado (embedded software)
☐ Outros. (por favor especifique).....
☐ Não desenvolve nem distribui software (Caso marque esta resposta, vá direto para a página 8, por favor, preencha seus dados, os da empresa e envie o questionário no envelope pré-pago)

2. Indique os principais (em volume e vendas) serviços oferecidos e/ou os produtos desenvolvidos por sua empresa para setores de atividade específicos. Marque (X) no máximo 5 alternativas.

Aplicação para Setores de Atividade Específicos	Software Pacote	Software Sob Encomenda	Software Customizado	Software Embarcado
Agropecuário / Agronegócios				
Armazenamento / Varejo e Distribuição				
Bancário				
Educação				
Energia				
Engenharia, Arquitetura e Construção Civil				
Engenharia de Software				
Governamental				
Manufatura				
Multimídia / Entretenimento				
Saúde				
Segurança				
Serviços				
Telecomunicações				
Transportes				
Turismo e Hospitalidade				
Outros. Por favor, especifique:				

3. Quando a empresa foi aberta? (ex. 2001)
.....(Ano).....

4. Qual é o número total de empregados da empresa (independentemente do regime de contratação)?.....

5. Quais dos itens abaixo melhor descrevem sua empresa? Marque (X) todas as alternativas que julgar apropriadas.

- ☐ Propriedade e operação independente
☐ Subsidiária de propriedade plena de uma empresa holding nacional
☐ Subsidiária de propriedade plena de uma empresa holding no exterior
☐ Subsidiária de propriedade parcial de uma empresa holding nacional

- ☐ Joint venture entre empresas locais
☐ Joint venture incluindo a propriedade de, pelo menos, uma empresa estrangeira. (Se este for o caso, parcela de propriedade estrangeira %).
☐ Outro (Por favor, especifique).....

6. Se sua empresa é uma subsidiária de uma empresa holding no exterior, indique o país onde se localiza a sede da empresa.

País:

7. Sua empresa é membro de alguma destas associações do setor? Marque (X) todas as alternativas que julgar apropriadas.

- ☐ ABES
☐ Abranet
☐ Assespro (qualquer regional)
☐ Softex (qualquer núcleo)
☐ Outra. Qual?.....
☐ Nenhuma

B. Estratégia, Internacionalização e Colaboração

1. A empresa adquiriu máquinas, equipamentos, softwares ou algum outro tipo de bem ou insumo estrangeiro nos últimos três anos (2003, 2004 e 2005)?

De um fornecedor local

- ☐ Sim ☐ Não

De um fornecedor no exterior

- ☐ Sim ☐ Não

2. Que proporção das compras de bens (máquinas, equipamentos, softwares, etc) ou insumos estrangeiros, em valor, foi adquirida pela empresa nos últimos três anos?

Em 2003, % Em 2004, % Em 2005, %
(estimativa)

3. Sua empresa exportou nos último três anos (2003, 2004 e 2005)?

- ☐ Sim ☐ Não

Caso Não, sua empresa já realizou alguma venda internacional anterior aos últimos três anos?

☐ Sim. Em qual ano ocorreu a primeira venda internacional?(ano)
☐ Não (vá para a seção C)

4. Qual percentagem de vendas da empresa foi obtida em mercados externos nos últimos três anos?

Vendas para mercados externos em 2003: %

Vendas para mercados externos em 2004: %

Vendas para mercados externos em 2005: %
(estimativa)

5. Quando sua empresa realizou a primeira venda internacional? Ano da primeira venda internacional:

6. Sua empresa possui alguma das modalidades abaixo de representação em outro(s) país(es)?

Subsidiárias

- ☐ Sim ☐ Não

Filiais

- ☐ Sim ☐ Não

Joint ventures

- ☐ Sim ☐ Não

7. Indique abaixo, em uma escala de 1 a 5, a frequência com a qual a empresa utiliza os seguintes canais de comercialização para vendas no mercado externo.

Canais de Comercialização	1 Nunca	2 Raramente	3 De vez em quando	4 Frequentemente	5 Com muita frequência
Agentes/representantes de vendas no Brasil					
Agentes/representantes de vendas no exterior					
Diretamente a consumidores no exterior via comércio eletrônico - B2C					
Diretamente a empresas no exterior via comércio eletrônico - B2B					
Diretamente a clientes no exterior por meio de exportação					
Distribuidores em mercados estrangeiros					
Escritórios de vendas da empresa no exterior					
Empresa holding					
Joint ventures					
Alianças e/ou consórcios					
Outros. Por favor, especifique:					

8. Para quantos países sua empresa exporta/opera atualmente?
..... Países.

9. Como você classificaria a atuação de sua empresa no mercado externo nos últimos três anos (2003, 2004 e 2005)? Marque (X) o número apropriado.

Queda significativa 1 2 3 4 5 Aumento significativo

10. Com que frequência, em uma escala de 1 a 5, sua empresa vende para os seguintes mercados/regiões? Marque (X) o número apropriado para cada região/mercado

Região/Mercado	1 Nunca	2 Raramente	3 De vez em quando	4 Frequentemente	5 Com muita frequência
América do Sul					
México & América Central					
Caribe					
Estados Unidos e Canadá					
Europa Oriental					
União Européia					
Comunidade dos Países de Língua Portuguesa (CPLP) ¹					
Oriente Médio & África					
Austrália e Nova Zelândia					
Ásia-Pacífico ² & Sul da Ásia ²					
China					
Japão					

11. A sua empresa possui uma área específica voltada para exportação/importação?
☐ Sim ☐ Não

12. Em que medida, em uma escala de 1 a 5, é realizado em sua empresa um planejamento formal de marketing para avaliar os mercados internacionais? Marque (X) o número apropriado.

Pouco ou quase nada 1 2 3 4 5 Significativo e bem detalhado

13. Em que medida, em uma escala de 1 a 5, os fatores externos a seguir representam limitações para o desenvolvimento de suas operações internacionais?

Marque (X) o número apropriado para cada fator

Fatores	1 Nenhuma limitação	2 Baixa	3 Média	4 Média alta	5 Alta limitação
Disponibilidade de pessoal qualificado no(s) local(is) em que a empresa está localizada					
Disponibilidade de capital financeiro a preços acessíveis					
Burocracia excessiva					
Condições econômicas dos mercados internacionais					
Infra-estrutura física e comercial (ex: serviços de telecomunicações, transporte)					
Legislação Tributária					
Certificação de qualidade					
Acordos Internacionais					
Ausência de uma política nacional de exportação					
Diferenças culturais entre os países					
Falta de imagem do software brasileiro no mercado internacional					
Política do governo de assistência à exportação					
Serviços de assessoria oferecidos pelo governo					
Falta de acesso a informações sobre mercados internacionais					
Competição dos mercados internacionais					
Tarifas/Barreiras de importação nos mercados internacionais					
Outro. Por favor, especifique:					

14. Indique, em uma escala de 1 a 5, em que medida sua empresa de fato desenvolveu arranjos colaborativos², nos últimos três anos (2003, 2004 e 2005), com os tipos de parceiros listados abaixo para acesso a mercados internacionais?

Marque (X) o número apropriado para cada tipo de parceiro

Tipo de parceiros	Origem do parceiro	1 De maneira alguma	2 Baixa	3 Média	4 Alta	5 Em grande medida
Clientes	Doméstico					
	Estrangeiro					
Fornecedores	Doméstico					
	Estrangeiro					
Empresas de TI	Doméstico					
	Estrangeiro					
Universidades	Doméstico					
	Estrangeiro					
Agências de Apoio a Empresas	Doméstico					
	Estrangeiro					
Institutos de Pesquisa e Tecnologia	Doméstico					
	Estrangeiro					
Governo Federal						
Governo Local (estadual/municipal)						
Organizações Internacionais						
Associações Empresariais no Brasil						
Governos Estrangeiros (ex: embaixadas, consulados, escritórios comerciais, etc)						
Outro. Por favor, especifique:	Doméstico					
	Estrangeiro					

¹CPLP = BRASIL, PORTUGAL, TIMOR LESTE, ANGOLA, CABO VERDE, GUINÉ-BISSAU, MOÇAMBIQUE, SÃO TOMÉ E PRÍNCIPE.
Ásia-Pacífico = HONG KONG, INDONÉsia, MALÁSIA, VIETNÃ, CINGAPURA, COREIA DO SUL, TAIWÃ, TAILÂNDIA, FILIPINAS.
Sul da Ásia = SRI LANKA, PAQUISTÃO, BANGLADESH, AFGANISTÃO.

²No escopo desta pesquisa, arranjos colaborativos são atividades conjuntas realizadas por parceiros ou empresas independentes que unem seus esforços em um processo de criação de valor.

15. Sua empresa realizou atividades de colaboração com micro, pequenas e médias empresas (MPMEs) da indústria de software e serviços correlatos para suas operações no mercado internacional nos últimos três anos (2003, 2004 e 2005)?

☐ Sim. Se SIM, em uma escala de 1 a 5, em que medida essas atividades de colaboração podem ser justificadas pelas razões abaixo?

Marque (X) o número apropriado

Razões	1 De maneira alguma	2 Baixa	3 Média	4 Alta	5 Em grande medida
Acesso a novos e maiores mercados					
Diversificação de produtos e serviços					
Acesso a Know-how e tecnologia					
Capacidade adicional de produção para sua empresa					
Redução de custos					
Acesso a mão de obra					
Acesso a capital financeiro					
Outros. Por favor, especifique:					

☐ Não. Se não, por favor, vá para a seção C.

16. Em uma escala de 1 a 5, com que frequência e com que tipo de colaboração sua empresa se envolveu com micro, pequenas e médias empresas (MPMEs) da indústria de software e serviços correlatos para suas operações no mercado internacional nos últimos três anos (2003, 2004 e 2005)?

Marque (X) o número apropriado para cada item

Tipo de Colaboração	MPMEs	1 Nunca	2 Raramente	3 De vez em quando	4 Frequentemente	5 Com muita frequência
Somente colaboração não formal	Brasil e nas estrangeiras					
Colaboração formal e não formal	Brasil e nas estrangeiras					
Somente colaboração formal	Brasil e nas estrangeiras					

C. Sobre a Participação em Redes

1. Nos últimos três anos (2003, 2004 e 2005), sua empresa participou de alguma rede de empresas?

☐ Sim ☐ Não. Se não, por favor, vá para a seção D.

2. Sua empresa ainda permanece envolvida nessas atividades de rede de colaboração?

☐ Sim ☐ Não. Se não, por favor, vá para a seção D.

Se a resposta for não, explique brevemente porquê:

Se a resposta for sim, responda o restante desta seção considerando a **mais importante rede** que sua empresa esteja participando atualmente.

3. Qual é a base dos relacionamentos de colaboração desenvolvidos nesta rede de empresas específica? Marque (X) todas as alternativas que julgar apropriadas.

- ☐ Um documento escrito (ex. contrato, acordo, etc) entre as partes
- ☐ Um acordo verbal entre as partes
- ☐ As empresas são membros de uma associação empresarial ou do setor
- ☐ Uma empresa especial estabelecida por parceiros de rede para realizar atividades de colaboração
- ☐ Uma iniciativa de rede estabelecida pelo governo ou por agências de apoio da qual as empresas façam parte
- ☐ Outra. Por favor, especifique:

4. Esta rede de empresas existe há quanto tempo?

.....Anos/.....Meses.

5. Em que medida, em uma escala de 1 a 5, as relações entre os parceiros desta rede específica estão baseadas nos fatores a seguir? Marque (X) o número apropriado para cada item

Fatores	1 De maneira alguma	2 Baixa	3 Média	4 Alta	5 Em grande medida
Acesso aos recursos do parceiro (ex: reputação, conhecimento, equipamentos, pessoas, etc)					
Complementaridade de atividades técnicas e de negócios					
Necessidade de resposta sincronizada de ambos os parceiros em atividades mútuas de negócios					
Relacionamentos Pessoais					
Acordos Escritos					
Outro. Por favor, especifique:					

6. Com que tipos de organizações são desenvolvidas tais atividades de rede de colaboração? Marque (X) todas as alternativas que julgar apropriadas

- ☐ Empresas do setor de software e serviços correlatos
- ☐ Empresas de outro setor
- ☐ Universidades
- ☐ Associações Profissionais/Comerciais
- ☐ Agências de Apoio a Empresas
- ☐ Institutos de Pesquisa e Tecnologia
- ☐ Governo local (estadual/municipal)
- ☐ Governo Federal
- ☐ Outros. Por favor, especifique:

7. Há outras empresas de software e serviços correlatos participando desta rede de empresas?

☐ Sim ☐ Não

Se a resposta for Sim, marque (X) todas as alternativas que julgar apropriadas sobre essas outras empresas em comparação a sua própria empresa.

	Sim	Não	Não se aplica
Tipo de produto ou serviço			
Semelhante			
Complementar			
Outros. Por favor, especifique:			
Tipos de setores			
Semelhantes			
Complementares			
Diferentes			
Outros. Por favor, especifique:			

¹ No segundo estudo, pesquisa, o termo "Rede de Empresas" significa uma colaboração intencionalmente criada e organizada entre dois ou mais atores (empresas ou instituições) que vão além de uma tarefa específica, com o propósito de alcançar um objetivo comum.

8. Em que medida, em uma escala de 1 a 5, sua empresa utilizou os canais a seguir para iniciar o desenvolvimento dos relacionamentos da rede acima citada?

Marque (X) o número apropriado para cada tipo de canal

Tipos de canais	1 De maneira alguma	2 Baixa	3 Média	4 Alta	5 Em grande medida
Feiras de Negócios					
Conferências					
Contatos Acadêmicos					
Iniciativas Governamentais					
Empresas Comerciais					
Indivíduos					
Outros. Por favor, especifique:					

9. Com que frequência sua empresa mantém contatos com outros parceiros para o desenvolvimento de atividades nesta rede de empresas específica?

Marque (X) somente uma opção.

- ☐ Várias vezes por semana
☐ Uma vez por semana
☐ Uma vez por mês
☐ Uma vez a cada seis meses
☐ Uma vez por ano

10. Aproximadamente quantas organizações, tanto públicas quanto privadas, participam desta mesma rede de empresas?

Números de parceiros da rede de empresas:

Privados: Parceiros

Públicos: Parceiros

11. Em relação à localização geográfica de sua empresa, onde se localiza a maioria das organizações com as quais, nos últimos três anos (2003, 2004 e 2005), sua empresa se envolveu e realizou atividades em rede?

Marque (X) somente uma opção.

- ☐ Estão localizadas na mesma cidade da empresa.
☐ Estão localizadas no mesmo Estado da empresa.
☐ Estão localizadas na mesma região (Norte, Nordeste, Centro-oeste, Sudeste, Sul) da empresa.
☐ Estão espalhadas em outros estados pelo Brasil.
☐ Estão localizadas em países estrangeiros.
☐ Outro. Por favor, especifique:

12. Indique, em uma escala de 1 a 5, em que medida você concorda ou discorda com a importância dos seguintes fatores como sendo críticos para que sua rede de empresas alcance seus resultados com sucesso.

Marque (X) o número apropriado para cada fator

Fatores	1 Discordo Inteiramente	2 Baixa	3 Média	4 Alta	5 Concordo Inteiramente
Confabilidade dos Participantes					
Semelhança dos valores empresariais dos Participantes					
Disposição dos Participantes de compartilhar informação interna					
Disposição dos Participantes de compartilhar dados confidenciais (Por exemplo, estruturas de custo)					

Fatores	1 Discordo Inteiramente	2 Baixa	3 Média	4 Alta	5 Concordo Inteiramente
A crença, entre os Participantes, de que os outros participantes não tentarão abandonar seus compromissos					
A crença, entre os participantes, de que outros participantes não tentarão tirar vantagem uns dos outros					
Percepção de Justiça em Negociações Conjuntas					
Envolvimento Significativo de Empreendedores nas Atividades da Rede					
Envolvimento Significativo dos Funcionários das Empresas Participantes da Rede					
Disponibilidade Continuada de Financiamento					
Recursos Disponíveis das Empresas Participantes					
Disposição dos Participantes de realizar mudanças internas para adaptar-se às metas da Rede					
Desejo dos Participantes de Melhorar a Posição Competitiva					
Desejo dos Participantes de Inovar					
Diversidade de Habilidades dos Participantes					
Sucesso dos Participantes Independentemente da Rede					
Conhecimento profundo dos valores e habilidades dos participantes por parte dos outros membros					
Crêditos para identificar e Selecionar Participantes					
Procedimentos explícitos para monitorar o desempenho do Participante					
Experiências Anteriores de Negócios dos Participantes entre si					
Relacionamentos Pessoais Significativos entre os Participantes					
Experiência anterior com Intermediário ou Agente Independente					
Existência de um Intermediário ou Agente independente					
Aceitação dos Clientes em relação à Rede de Empresas					
Proximidade Geográfica dos Participantes					
Condições Macroeconômicas					
Outro. Por favor, especifique:					

13. Qual é a importância no momento, em uma escala de 1 a 5, das razões abaixo para sua empresa buscar e manter relacionamentos de colaboração com as organizações desta rede de empresas? Marque (X) o número apropriado para cada fator

Razões	1 Não é importante	2 Baixa	3 Média	4 Alta	5 É muito importante
Falta de oportunidade de crescimento doméstico					
Ampliação de acesso a capital financeiro					
Ampliação de acesso a tecnologia					
Aumento da concorrência no mercado doméstico					
Acesso a trabalho qualificado					
Diversificação de risco e volatilidade					
Acesso a técnicas de gerenciamento					
Custos mais baixos de produção					
Oportunidades de crescimento em mercados maiores					
Superação de restrições de proteção					
Vantagens técnicas ou vantagens de liderança de produtos					
Informação sobre oportunidades					
Planejamento criterioso e pesquisa de mercado					
Percebeu a oportunidade e não deixará que ela escape					
Outra. Por favor, especifique:					

14. Em sua opinião, utilizando uma escala de 1 a 5, a participação nesta rede de empresas específica contribuiu para a competitividade de sua empresa?

Marque (X) o número apropriado

1 De maneira alguma	2 Baixa	3 Média	4 Alta	5 Em grande medida

Sinta-se à vontade para acrescentar outros comentários:.....

D. Contexto, Estrutura e Desempenho da Empresa

1. Em uma escala de 1 a 5, indique de que forma sua empresa realiza as atividades e tarefas descritas abaixo.

Marque (X) o número apropriado para cada afirmação

Atividades	1 Nunca fazemos	2	3	4	5 Fazemos de maneira muito minuciosa
Avaliamos como nosso relacionamento com um parceiro de negócios depende de nosso relacionamento com outros parceiros					
Avaliamos como nosso relacionamento com um parceiro de negócios interfere em nosso relacionamento com outros parceiros					
Organizamos reuniões regulares entre as pessoas da empresa envolvidas nos relacionamentos com nossos parceiros de negócios e com os próprios parceiros de negócios.					
Designamos pessoas para cada relacionamento com nossos parceiros de negócios.					
Atribuímos responsabilidade a pessoas para cada relacionamento com nossos parceiros de negócios					
Usamos outras organizações, além de nossos atuais parceiros de negócios, para identificar parceiros de negócios em potencial (ex. consultores, associações do setor, organizações do governo).					
Visitamos exposições e feiras para identificar parceiros de negócios em potencial.					
Pesquisamos periódicos especializados para identificar parceiros em potencial.					
Discutimos maneiras de colaborar com o pessoal de nossos parceiros de negócios.					
Promovemos o contato entre nossos parceiros de negócios e as pessoas chave em nossa empresa.					
Promovemos o contato entre o pessoal de nossa empresa e pessoas chave de nossos parceiros de negócios.					

2. Em uma escala de 1 a 5, indique em que medida você concorda ou discorda com as afirmações abaixo que descrevem os vários atributos das pessoas em sua empresa que estão envolvidas no contato com os parceiros de negócios da empresa.

Marque (X) o número apropriado para cada afirmação

Afirmções	1 Discordo inteiramente	2 Discordo	3 Indiferente	4 Concordo	5 Concordo inteiramente
Elas têm bom relacionamento com pessoas importantes de nossa empresa.					

Afirmções	1 Discordo inteiramente	2 Discordo	3 Indiferente	4 Concordo	5 Concordo inteiramente
Elas têm bom conhecimento sobre o funcionamento da empresa.					
Elas têm bom conhecimento sobre o funcionamento da empresa de nosso parceiro de negócios.					
Elas têm experiência em lidar com parceiros de negócios.					
Elas têm facilidade de comunicar suas necessidades a outros.					
Elas fazem negociações com outros com segurança.					
Elas interagem bem com outras pessoas					
Elas percebem facilmente um conflito em potencial					
Elas têm facilidade de encontrar soluções quando há um conflito.					

3. Que percentagem de sua força de trabalho tem os níveis de formação a seguir?

Nível de formação	Porcentagem da força de trabalho que tenha alcançado este nível como mais alto
Não possui educação formal	%
Ensino Fundamental	%
Ensino Médio	%
Graduação Superior	%
Pós-Graduação, Lato sensu	%
Mestrado	
Doutorado (PhD)	
Total	100%

4. Indique as certificações de qualidade que sua empresa possui marcando (X) todas as alternativas que julgar apropriadas.

- ☐ Não possui certificações.
☐ ISO 9001
☐ CMM (Capability Maturity Model). Que nível?
☐ CMMI (Capability Maturity Model Integration). Que nível?
☐ Qualquer outra (Por favor, especifique):.....

5. Em qual faixa de valor se situou a receita bruta (em R\$) de sua empresa no ano de 2004?

- ☐ Até R\$ 240.000,00
☐ De R\$ 240.000,01 a R\$ 1.000.000,00
☐ De R\$ 1.000.000,01 a R\$ 2.000.000,00
☐ De R\$ 2.000.000,01 a R\$ 5.000.000,00
☐ De R\$ 5.000.000,01 a R\$ 10.000.000,01
☐ De R\$ 10.000.000,01 a R\$ 20.000.000,00
☐ De R\$ 20.000.000,01 a R\$ 50.000.000,00
☐ Acima de R\$ 50.000.000,00

6. Qual é a proporção do volume de vendas total da empresa investida em atividades de Pesquisa e Desenvolvimento⁴ nos últimos três anos?

Investimento em P&D em % volume total de vendas em 2003%
 Investimento em P&D em % volume total de vendas em 2004%
 Investimento em P&D em % volume total de vendas em 2005%
 (estimativa)

⁴ PESQUISA E DESENVOLVIMENTO (P&D) NO ISCORO DIETA: PESQUISA CONHECE UM CONJUNTO DE AÇÕES SISTEMÁTICAS QUE ENVOLVEM A CRIAÇÃO DE CONHECIMENTO E A ADAPTAÇÃO DE TECNOLOGIAS JÁ EXISTENTES NA FORMA DE PRODUTOS E PROCESSOS ACABADOS, INCLUINDO A REALIZAÇÃO DE AVANÇOS TECNOLÓGICOS OU CENTÍFICOS.

7. Sua empresa é detentora de alguma patente?

No Brasil

☐ Sim

☐ Não

No Exterior

☐ Sim

☐ Não

8. Qual é a importância dos fatores abaixo, em uma escala de 1 a 5, no sentido de representarem obstáculos às tentativas da empresa de realizar negócios no exterior?

Marque (X) o número apropriado para cada fator

Fatores	1 Não faz diferença	2 Baixa	3 Média	4 Importante	5 É muito importante
Falta de domínio de outras línguas					
Falta de domínio das leis / normas / padrões estrangeiros					
Falta de subsidiárias/filiais fora do Brasil					
Falta de acordos de colaboração com as firmas estrangeiras					
Falta de experiência no exterior					
Falta de competência/conhecimento específicos em relação aos procedimentos					

9. Em sua opinião, qual é o principal mercado (em volume de vendas) para seu principal produto ou grupo de serviços? Marque (X) somente uma opção abaixo.

- ☐ Local (sua cidade/ seu estado)
- ☐ Regional
- ☐ Nacional
- ☐ Internacional

10. Seus principais concorrentes atuam em que contexto? Marque (X) todas as alternativas que julgar apropriadas.

- ☐ Local (sua cidade/ seu estado)
- ☐ Regional
- ☐ Nacional
- ☐ Internacional

E. Mecanismos de Acesso, Coordenação e Governança

1. Em que medida, utilizando uma escala de 1 a 5, você concorda ou discorda com as seguintes afirmações?

Marque (X) o número apropriado para cada afirmação

Afirmação	1 Discordo Inteiramente	2	3	4	5 Concordo Inteiramente	Não se aplica
A empresa faz uso de mecanismos de resolução de problemas para coordenar as interações e solucionar problemas com os parceiros de negócios.						
A empresa faz uso de rotinas de negociações e ajustes mútuos com seus parceiros de negócios.						
A empresa faz uso de mecanismos estruturados de comunicação e monitoramento criteriosos para coordenar interações e buscar soluções para problemas com seus parceiros de trabalho.						
Existe uma estrutura de apoio (serviços de incubação de empresas e profissionais, suporte financeiro, etc.) acessível para as empresas e empreendedores da indústria de software e serviços correlatos na cidade e no estado em que a empresa se encontra.						
Existem redes mais amplas (tecnológicas, institucionais, etc) que operam no local ou na região em que a firma se encontra.						

Afirmação	1 Discordo Inteiramente	2	3	4	5 Concordo Inteiramente	Não se aplica
A empresa tem fácil acesso a redes mais amplas estabelecidas tais como redes institucionais, tecnológicas e de políticas.						
Há iniciativas efetivas de agências de suporte a empresas ou de agências governamentais direcionadas especificamente para dar assistência a empresas e empreendedores da indústria de software e serviços correlatos em minha cidade/estado.						
A empresa está envolvida em interações constantes com os vários níveis de agências governamentais e reguladoras, e com representantes de políticas nesta cidade e estado que são essenciais para a aquisição de recursos externos.						
A principal rede da qual a empresa participa foi estabelecida mediante termos formais de colaboração.						
A principal rede de negócios da qual a empresa participa é gerenciada com base em um planejamento detalhado, no estabelecimento de metas e um sistema orçamentário que permite que os objetivos sejam alcançados.						
A principal rede de negócios da qual esta empresa participa tem mecanismos estabelecidos para comunicações regulares e vínculos operacionais, que permite que sejam desenvolvidos vínculos interpessoais e normas de colaboração.						
Na principal rede da qual a empresa participa, seus parceiros tomam decisões rápidas e processam informações complexas.						
A principal rede da qual a empresa participa é caracterizada por sistemas sociais informais em vez de estruturas burocráticas e relacionamentos contratuais formais.						
Existe um equilíbrio de poderes entre os parceiros na principal rede de negócios da qual a empresa participa.						
A grande maioria das organizações com as quais a empresa está envolvida na sua principal rede de negócios está localizada na mesma cidade de sua empresa.						

F. Orientação Empreendedora Internacional e Gestão da Empresa

1. Marque (X) o número que melhor caracterize sua empresa para cada uma das afirmações a seguir:

Afirmação	1 Não ocorre desta forma	2	3	4	5 Aplica-se perfeitamente
Minha empresa é a favor de uma forte ênfase em pesquisa e desenvolvimento, liderança tecnológica e inovação do produto.					
A alta gerência de minha empresa tem uma forte tendência a assumir projetos de alto risco (com chances de retorno muito alto).					
A alta gerência de minha empresa acredita que, dependendo da natureza do ambiente, atitudes abrangentes e corajosas são necessárias para que se alcancem os objetivos da empresa.					
Diante de situações em que seja necessário tomar decisões que envolvam incertezas, minha empresa geralmente adota uma postura agressiva para maximizar a probabilidade de se explorar oportunidades em potencial.					

Afirmção	1 Não ocorre desta forma	2	3	4	5 Aplica-se perfeitamente
Minha empresa é a favor de uma forte ênfase em pesquisa e desenvolvimento, liderança e inovação tecnológica.					
Minha empresa tem uma alta proporção de produtos que os consumidores consideram superiores aos da concorrência.					
O desenvolvimento de técnicas inovadoras de marketing é importante para a estratégia da empresa.					
Utilizar forças de venda/agentes de venda qualificados é importante para a estratégia da empresa.					
Nos últimos três anos, melhoramos significativamente a efetividade de nossas funções de marketing como as de venda, distribuição e propaganda.					
Na definição de nossas estratégias de negócios, nos concentramos na percepção de oportunidades.					
Não permitimos que os recursos disponíveis (ou não) representem uma limitação para nós.					
Nossa tarefa fundamental é aproveitar oportunidades que consideramos válidas e depois buscar uma forma de adquirir recursos para explorá-las.					
As oportunidades são o que controlam nossas estratégias de negócios.					
O que precisamos de nossos recursos é a capacidade de utilizá-los.					
Preferimos ter total controle e sermos proprietários dos recursos que utilizamos.					
Usualmente utilizamos recursos terceirizados ou alugados.					
Preferimos utilizar somente recursos próprios em nossos empreendimentos.					
Na empresa, como um todo, tem-se a idéia de que crescimento é o nosso principal objetivo.					
Crescimento não é necessariamente nosso principal objetivo. A vida da empresa em longo prazo é, pelo menos, tão importante quanto.					
Na empresa, como um todo, tem-se a idéia de que nossa intenção é crescer ao máximo e o mais rápido possível.					
Antes de iniciar o processo de vendas internacionais de nossos produtos buscamos informações detalhadas sobre as condições e a demanda do mercado ou o nível de competição em um ou mais países estrangeiros.					
Antes de iniciar o processo de vendas internacionais de nossos produtos comprometemos significativos recursos financeiros e humanos para essas operações.					
Antes de iniciar o processo de vendas internacionais de nossos produtos modificamos significativamente nossos produtos/serviços para atender as necessidades de mercados estrangeiros.					

4. Qual é seu nível de formação? Marque (X) somente uma opção abaixo.

- ☐ Não possui educação formal
☐ Ensino Fundamental
☐ Ensino Médio
☐ Graduação Superior
☐ Pós-graduação. Por favor, Especifique:

5. Quantos anos de experiência você tem na indústria de software e serviços correlatos?.....anos

6. Em quantas línguas, além do Português, você tem a habilidade de fazer negócios? Marque (X) somente uma opção.

- ☐ Nenhuma
☐ 1
☐ 2
☐ 3
☐ 4 ou mais

7. Você estaria disponível para continuar contribuindo com este projeto por meio de uma entrevista de acompanhamento para que a pesquisadora compreenda plenamente a posição de sua empresa?

- ☐ Sim ☐ Não

Por favor preencha os dados a seguir:

Seu nome:
 Cargo:
 E-mail:
 Razão Social da Empresa:
 CNPJ:
 Endereço:
 Cidade: Estado:
 CEP: Telefone:
 Website da empresa:

Data de preenchimento do questionário:...../...../2005

Obrigada por responder este questionário! Sua ajuda será muito útil.
Favor enviar este questionário utilizando o envelope pré-pago anexo.

Sinta-se à vontade para acrescentar quaisquer comentários sobre os tópicos tratados ou sobre o próprio questionário no espaço abaixo:

G. Informações Sobre o Respondente

1. Gênero:

- ☐ Feminino
☐ Masculino

2. Nacionalidade:.....

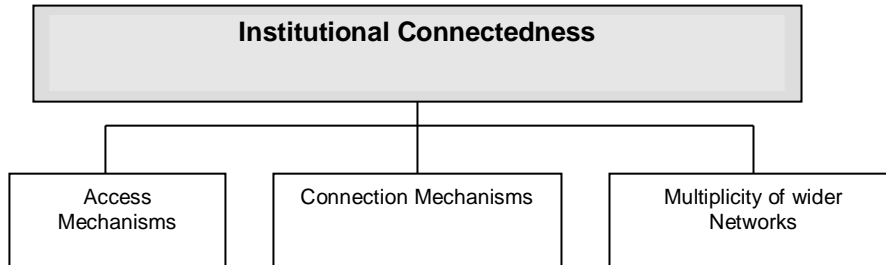
3. Quantos anos você tem? Marque (X) somente uma opção abaixo.

- ☐ Até 21 anos ☐ 41 -50 anos
☐ 22 - 30 anos ☐ 51 -60 anos
☐ 31 - 40 anos ☐ Mais de 60 anos

Appendix F: Constructs of the Study

CONTEXTUAL DIMENSION VARIABLES:

Construct: Institutional Connectedness



Access Mechanisms comprises three items:

Questionnaire Item	Statement
E1_4	In the city and state where the company is located there is a support structure (incubation services, financial support, etc) accessible to businesses and entrepreneurs in the software and allied services sector.
E1_6	This company has easy access to established broader networks such as institutional and policy, and technological networks.
E1_15	The great majority of organisations with which the company is involved in its main business network are located in the same city as the company.

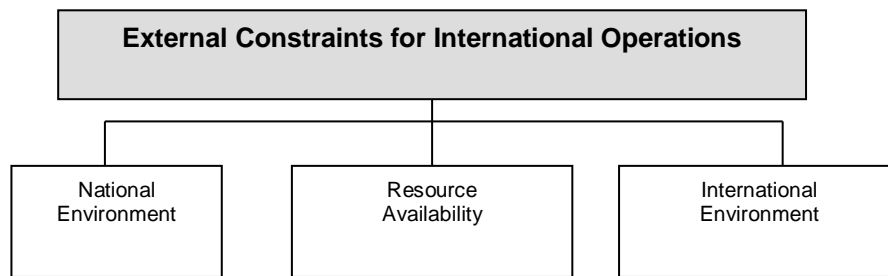
Connection Mechanisms comprises one item:

Questionnaire Item	Statement
E1_8	The company is involved in constant interaction with the various levels of governmental and regulatory agencies, and with political representatives in this city and state, essential for the acquisition of external resources.

Multiplicity of Wider Networks comprises two items:

Questionnaire Item	Statement
E1_5	In the locality or region where this firm operates there are broader networks (technological, institutional, etc).
E1_7	In my city/state there are effective initiatives by business-support agencies or governmental agencies directed specifically to provide assistance to businesses and entrepreneurs in the software industry and allied services sector.

Construct: External Constraints for International Operations



National Environment comprises five items:

Questionnaire Item	Factors
B13_3	Excessive bureaucracy
B13_5	Physical and commercial infrastructure e.g. telecommunications, transport
B13_6	Taxation
B13_9	Lack of national export policy
B13_12	Government policy in export assistance

Resource Availability comprises five items:

Questionnaire Item	Factors
B13_1	Availability of qualified personnel where the business is located
B13_2	Availability of financing at affordable rates
B13_7	Quality certificates
B13_13	Advisory services offered by government
B13_14	Lack of access to information about international markets

International Environment comprises six items:

Questionnaire Item	Factors
B13_4	Economic conditions in the foreign markets
B13_8	International agreements
B13_10	Cultural differences
B13_11	Lack of image for Brazilian software internationally
B13_15	Competition in international markets
B13_16	Import tariffs/barriers in international markets

NETWORK DIMENSION VARIABLES:

Construct: Governance Mechanisms

Governance Mechanisms comprises 6 items:

Questionnaire Item	Statement
E1_9	The main business network in which the company participates was established under formal terms of collaboration.
E1_10	The main business network in which the company participates is managed on the basis of detailed planning, establishment of goals, and a budgetary system which allows its objectives to be reached.
E1_11	The main business network in which the company participates has established mechanisms for regular communication and operational links, which allow interpersonal links and collaborative norms to be developed.
E1_12	In the main network in which the company participates, its partners make quick decisions and process complex information.
E1_13	The main business network in which the company participates is characterised by informal social systems rather than bureaucratic structures and formal contractual relationships.
E1_14	There is a balance of power between the partners in the main business network to which the company belongs.

Construct: Trust

Construct Trust comprises seven items:

Questionnaire Item	Factors
C12_1	Reliability of Partners
C12_2	Similarity of Business Values of Partners
C12_3	Willingness of Partners to share Internal Information
C12_4	Willingness of Partners to share Sensitive Data e.g. Cost Structures
C12_5	The belief among the participants that the others will not try to go back on their Commitments
C12_6	The Belief among the Participants that one will not try to Take Advantage of the Others
C12_7	Perception of Fairness in Joint Negotiations

Construct: Commitment

Commitment comprises three items:

Questionnaire Item	Factors
C12_12	Willingness of Participants to Make Internal Changes to adapt themselves to the goals of the Network
C12_13	Desire of Participants to Improve their Competitive Position
C12_14	Desire of the Participants to Innovate

Construct: Capabilities of Partners

Capabilities of Partners comprise five items:

Questionnaire Item	Factors
C12_15	Skills diversity of Participants
C12_16	Success of Participants Independently of the Network
C12_17	Profound knowledge of the values and skills of Participants on the part of the Others
C12_18	Criteria for Identifying and Selecting Participants
C12_19	Explicit Procedures for monitoring the Performance of participants

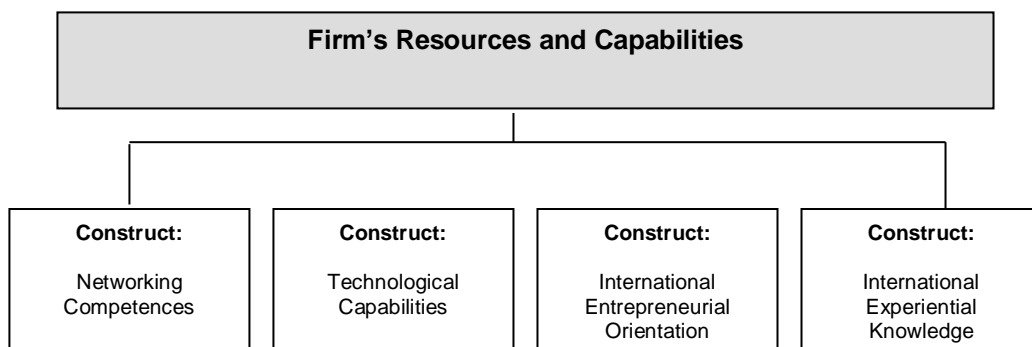
Construct: Interdependence between Partners

Interdependence between Partners comprises four items:

Questionnaire Item	Factors
C5_1	Access to resources of partner e.g. reputation, knowledge, equipment, personnel
C5_2	Complementarity of technical and business activities
C5_3	Need for synchronised response of both partners in mutual business activities
C5_5	Written agreements

ORGANISATIONAL DIMENSION VARIABLES:

Firm's Resources and Capabilities



Construct: Networking Competences

Networking Competences comprises 20 items:

Questionnaire Item	Statement
D1/D2	D1_1: We evaluate how our relationship with one business partner may depend on our relationship with other partners
	D1_2: We evaluate how our relationship with one business partner may affect our relationship with other partners
	D1_3: We organize regular meetings among our company personnel involved in relationships with our business partners, and with the partners themselves
	D1_4: We assign people for each relationship with our business partners.
	D1_5: We assign responsibility to individuals for each relationship with our business partners.
	D1_6: We use other organisations, apart from our current business partners, to identify potential business partners (e.g. consultants, sectoral associations, government organisations).
	D1_7: We visit exhibitions and fairs to identify potential business partners.
	D1_8: We research specialised magazines to identify potential business partners.
	D1_9: We discuss forms of collaboration with the personnel of our business partners.
	D1_10: We promote contacts between our business partners and the key people in our company.
	D2_1: We promote contacts between the personnel of our company and our business partners' key people.
	D2_2: They have a good relationship with important people in our company.
	D2_3: They have good knowledge of how the company works.
	D2_4: They have a good knowledge of the functioning of the company of our business partner.
	D2_5: They have experience in dealing with business partners.
	D2_6: They are good at communicating their needs to others.
	D2_7: They negotiate confidently.
	D2_8: They interact well with other people.
	D2_9: They easily sense potential conflict.
	D2_10: They are good at finding solutions when there is conflict.

Construct: Technological Capabilities

Technological Capabilities comprises four items:

Questionnaire Item	Components
D6_1	Percentage of R&D investment to the total sales volume - 2003
D6_2	Percentage of R&D investment to the total sales volume - 2004
D6_3	Percentage of R&D investment to the total sales volume - 2005
D7	Does your company hold any patent in Brazil and Abroad?

Construct: International Entrepreneurial Orientation

International Entrepreneurial Orientation comprises 23 items:

Questionnaire Item	Statement
F1_1	In dealing with competition, my company is generally the first to present new products and services, administrative and operational techniques, technology, etc.
F1_2	The top management of my company has a strong tendency to take on high-risk projects (with chances of very high returns).
F1_3	The top management of my company believes that, depending on the nature of the environment, broad and courageous attitudes are necessary to achieve the company's objectives.
F1_4	Faced with situations in which it is necessary to take decisions which involve uncertainties, my company generally adopts an aggressive posture to maximize the probability of exploiting potential opportunities.
F1_5	My company is in favour of a strong emphasis on R&D, leadership and technological innovation.
F1_6	My company has a high proportion of products which customers consider superior to the competition.
F1_7	The development of innovative techniques of marketing is important to the company's strategy.
F1_8	Utilising qualified sales force/sales agents is important for my company's strategy.
F1_9	In the last three years we have improved significantly the effectiveness of our marketing functions such as sales, distribution, and advertising.
F1_10	In defining our business strategies we focus on spotting opportunities.
F1_11	We don't let resources, whether available or not, represent a limitation for us.
F1_12	Our fundamental task is to take advantage of opportunities which we consider valid, and afterwards find a way of acquiring resources to exploit them.
F1_13	Opportunities are what control our business strategies.
F1_14	What we need from our resources is the capacity to utilize them.
F1_15	We prefer to have total control and to be owners of the resources we use.
F1_16	We usually use third-party or hired resources.
F1_17	We prefer to use only our own resources in our undertakings.
F1_18	The company as a whole has the idea that growth is our principal objective.
F1_19	Growth isn't necessarily our main objective. The life of the company in the long term is at least as important.
F1_20	The company as a whole has the idea that our intention is to grow to the maximum and as fast as possible.
F1_21	Before initiating the process of international sales of our products we seek detailed information about the conditions and the market demand or the level of competition in one or more foreign countries.
F1_22	Prior to beginning the process of international sales of our products we commit significant financial and human resources to these operations.
F1_23	Prior to initiating the process of international sales of our products we modify significantly our products or services to match the requirements of foreign markets.

Construct: International Experiential Knowledge

International Experiential Knowledge comprises six items:

Questionnaire Item	Obstacles to do business abroad Factors
D8_1	Lack of command of other languages
D8_2	Lack of knowledge of foreign laws/norms/customs
D8_3	Lack of subsidiaries/affiliates outside Brazil
D8_4	Lack of collaborative agreements with foreign firms
D8_5	Lack of experience abroad
D8_6	Lack of specific competence/knowledge in relation to procedures